The Crop with no Futures

Explaining the Absence of Derivatives Trading in the Rice Market

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Abstract

This thesis seeks to explain the near absence of derivative contracts in the rice market, in the light of these instruments' prominence in other agricultural commodity markets. To do so, I compare rice with three of these commodities – wheat, sugar and coffee – identifying differences preventing or encouraging the financial development of rice and not of others. I explore the development of derivatives markets in four geographic case studies: the USA, Thailand, Japan and Vietnam. To answer the research question, I primarily use interview data of industry stakeholders in the four markets examined, such as farmers, millers, traders, analysts and contract engineers. The research determines why rice stands as an exception in regard to financial development and this case provides in return a new approach to the development of derivatives market. The study challenges the common argument of the existing literature that a single factor is enough to impede the development of a futures market. In the case of rice, it is the accumulation of obstacles that supress futures trading. I argue through this thesis that the propensity of market participants to get involved in a derivative market is key to the outcome of financial development. In rice, two types of factors deter the participation of key stakeholders in the building of financial markets: (i) their risk profile, affected by factors such as their ability to store the commodity and the prevalence of their crop risk over price risk; (ii) the potential weakening of their market power by futures contracts. Such power can be the result of the profile of the supply chain, but its most important driver is the opacity of the rice market. Three other factors, more systemic, appear particularly important: (i) the heavy politicization of the rice market disrupts the nature of the risk that can be hedged and traded with futures contracts; (ii) the geography of the physical market does not favour financial development. Derivatives markets find their roots in the financially sophisticated economies of developed countries, before expanding onto the markets of developing countries. However, for markets that are almost exclusively situated in developing countries, like rice, financial development struggles to take place endogenously: (iii) the fragmentation of the market into different varieties is not conducive to the construction of a standardised market. Finally, this thesis highlights the importance of the link between OTC markets and futures markets to the success of financial development.

Lay summary

In this thesis, I investigate the reasons why, unlike most other agricultural crops, rice is not traded on financial markets. To do so, I lead a comparative analysis between rice, wheat, sugar and coffee. This allows me to identify what criteria makes an agricultural good suitable for this form of trading that serves both risk management for actors of the supply chain, and an investment opportunity for speculators.

In order to understand the differences between rice and other crop studied, I explore cases in the USA, Thailand, Japan and Vietnam. In these countries, I review the success and failure of financial products meant to trade agricultural commodities. To do so, I interviewed a range of market participants such as farmers, millers, traders, analysts and finance professionals.

The common argument in existing literature is that a single characteristic of the market is enough to make the crop unsuitable for financial trading. In this study, I argue otherwise. I explain that the rice market faces a variety of obstacles preventing its trading on financial markets. This includes the lack of potential market participants: actors that have the technical potential to hedge rice prices on financial market are reluctant to, either because they have other risk management solutions or because financial trading is a threat to their market power. Three other factors appear particularly important: (i) there is a lot of government intervention in rice, whereby, the market is not liberalised enough for financial risk management and speculation; (ii) the market is almost exclusively located in developing countries with economies that are not financially mature; (iii) financial markets prefer raw materials that are uniform. The rice market is made of a large range of varieties and qualities of the grain, making it unsuited to financial trading. Coffee, sugar and wheat do not face such obstacles. Their geographical organisations, the types of regulations propose by governments, and their relative uniformity, make them fit the needs for financial trading

Declaration

I declare that this thesis was composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgement, the work presented is entirely my own.

Signed,

Sulian Lizé

Place and date:

Oxford, 25th of May, 2021

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List of Essential Abbreviations

AFET	Agricultural Futures Exchange of Thailand
AFTC	Agricultural Futures Trading Commission
ASEAN	Association of South East Asian Nations
BAAC	Bank for Agriculture and Agricultural Cooperation
BCCE	Buon Ma Thuot Coffee and Commodity Exchange
BCEC	Buon Ma Thuot Coffee Exchange Center
CBOT	Chicago Board of Trade
CFTC	Commodity Futures Trading Commission
CME	Chicago Mercantile Exchange
DP	Democratic Party of Japan
EU	European Union
FAO	Food and Agriculture Organisation
FOB	Free-on-board
HTA	Hedge to Arrive
ICA	International Coffee Agreement
ICDX	Indonesia Commodity &Derivatives Exchange
ICE	Intercontinental Exchange
ISA	International Sugar Agreement
IWA	International Wheat Agreement
JA	Japan Agriculture
KEX	Kansai Commodities Exchange
LDP	Liberal Democratic Party of Japan
LIFFE	London International Financial Futures and Options Exchange
LRI	LiveRiceIndex
FOX	London Futures and Options Exchange
MAFF	Ministry of Agriculture Forestry and Fisheries (Japan)
MCX	Multi Commodity Exchange of India
NYMEX	New York Mercantile Exchange
ODE	Osaka Dojima Commodity Exchange
OPEC	Organisation of the Petroleum Exporting Countries
OTC	Over-The-Counter
PB	Parboiled Rice
PLC	Price Loss Coverage
PTBF	Price-to-be-fixed
PTP	Pheu Thai Party
TGE	Tokyo Grain Exchange
TOCOM	Tokyo Commodity Exchange
US	United States of America
VNX	Vietnam Commodity Exchange
WR	White Rice
WWII	World War Two

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Chapter I: Introduction and Conceptual Framework

"Understand, a lot of our markets – corn, wheat and oats – launched on January 2nd, 1877; rice has been around since 1986. So almost every institution that trades or handles or deals in corn, soybeans, wheat, meal, oil… futures are integrated into that. And rice? It's not that way yet. So a lot of what we are talking about in respect to liquidity, is just a market and the institutions within that are only kind of starting … so that can take time."

In the summer of 2017, Fred Seamon,[1] the Executive Director in Agricultural Markets of the Chicago Mercantile Exchange (CME) told me in those words that history was a contributing factor to the modest liquidity of its rough rice futures contract. While being a viable and important explanation from the perspective of the exchange in the case of this particular American contract, the picture for the rice market across the globe is more complex. The history of derivative finance for rice goes back much further than when it was first listed on the Chicago Board of Trade (CBOT) in 1986. In fact, derivative finance was invented precisely for rice, back in the 17th century, in Japan. However, unlike other agricultural commodities for which the creation of their major futures contracts in the late 19th century led to their long-term development, rice experienced a chaotic history of financial development. Over three centuries, some functioning futures contracts for rice disappeared without being replaced, while many others simply failed. This has led to present times where rice stands as an exception within major food commodities: the one that does not use derivatives. Whether derivative finance is seen as an opportunity for market participants to manage risk and obtain information, or a force destabilising prices, understanding what causes the development of these markets to happen or not is necessary for the study of a commodity market. It becomes even more valuable when this market is the food staple of half of the world's population and is often believed to be the biggest employing

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[1] Interview with Fred Seamon, Director in Agricultural Markets at CME Group, Chicago, USA, September 2017.

industry globally, with an estimated 1 billion households depending on it for their livelihood (Diouf, 2003). In many developing countries, the mechanisms of the rice market have far-reaching implications for the life of both the city dwellers feeding themselves with rice and the rural poor for whom paddy[2] production is the main livelihood. This thesis aims to explain why rice differs from other agricultural markets in its financial development patterns.

In this introduction, I provide the background to this research. I start by defining financial development, portraying the rice market and introducing several successive key concepts such as risk and derivative contracts. I subsequently introduce the prominence of derivatives trading in agricultural markets and provide a brief history of futures contracts for rice. These discussions will lead me to the problem statement. Thereafter, I present the hypotheses to answer the research question, before introducing my methodology to explore these hypotheses. Finally, I provide a first overview of the findings and arguments of this thesis, also allowing me to discuss my contribution to the field.

I) Defining financial development

As this thesis aims to analyse the financial development of various commodity markets, clearly defining financial development is necessary to support further discussion. A physical commodity market can develop in various ways, such as progress in its infrastructure, the widening of its geographical scope or the growth in the volumes traded. This thesis is a study of the development that results in participants in a commodity market being increasingly able to trade risk – in particular, price risk – through the use of financial contracts. I refer to this phenomenon as the *financial development of a commodity market*.

The concept of *financial development* is already used in the literature, although its definitions vary. For instance, Mendoza, Quadrini and Rios-Rull state that financial development "is defined by the extent to which a country's legal system can enforce financial contracts among its residents so that they can use these contracts to insure

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[2] The expression refers to rice before milling. Outside of the USA, it is called paddy.

against idiosyncratic risks" (2009, p. 373). Such a definition constrains the phenomenon to the national level and uses the legal system as the single factor for financial development. Guiso, Sapienza and Zingales (2004) define financial development as the level of access to credit. Some authors also equate financial development to the growth in financial intermediation (De Gregorio & Guidotti, 1995; Patrick, 1966). Levine believes that financial development occurs when financial markets, instruments and intermediaries ameliorate five financial functions that are "(i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings, and (v) exchange of goods and services" (2005, p. 870). This broad definition covers all possible functions of financial markets, making it particularly useful for the study of the financial sector's development as a whole. However, when studying specific financial markets, one of the above functions is usually the primary role of the market and the others are by-products. For instance, derivatives markets primarily aim at enhancing function (iii), while (i) and (v) are the results of these markets mechanisms, and (ii) and (iv) remain marginal effects. Levine's approach is therefore too broad for my purpose here. Sahay et al. (2015) also provide a relevant definition of financial development as a combination of depth, access and efficiency of both financial institutions and financial markets. The issue with this definition is that it is built to serve the index proposed by the authors, leaving little room for the study of the process of development. For instance, by focusing on financial institutions and markets, it ignores the role of non-financial actors in that process. These non-financial actors are particularly important in food commodity markets. These definitions do not fit exactly the needs of this thesis because the concept of financial development used in these contexts is the development of the financial sector, its structures and mechanisms. In this thesis, I am instead interested in the development of physical commodity markets where finance (or more precisely, as I explain later in this section, derivative finance) is the means to this development. By discussing the *financial development of a commodity market*, I am therefore not grounding this thesis in the realm of the existing literature on *financial development*.

I adopt a definition of financial development based on Rajan's (2006) understanding of the concept, that is the financial sector's ability to spread risk, and what Hardie calls financialization,[3] that is “the measure of the ability to trade risk” (2012, p. 4). Linking finance and risk management fits the function of hedging markets within the commodity industry. However, in Rajan’s definition, the use of the expression “spreading risk” is contentious as it can be argued that finance is instead a transferring of risk from many risk averse individuals to few risk-seeking counterparties and so instead concentrates risk. Therefore, I prefer Hardie’s concept of risk trading. Rajan, like the definitions discussed in the previous paragraph, also uses the financial sector as the primary object of study, which does not fit the aim of this thesis, as I will argue later in this section. Understanding, as Hardie does, the concept as a measure is interesting as it provides a way to quantify the gradual process of the development. It is useful because by looking at rice, I am analysing a market’s financial development in its early stages. It avoids a binary classification, where a commodity would be financially developed or not. However, as already mention when discussing Sahay et al. (2015), financial development needs to be understood not only as a measure (and therefore a degree) of the ability to trade risk, but also as a process of increasing ability to trade risk. The ability to trade risk should be understood as the ability to sell or buy price risk. In situations of market development, this is very often through the use of derivatives trading. As a result, this thesis focuses extensively on derivatives markets.

This definition has the advantage of being a neutral starting point when discussing the effects of the phenomenon. The social science literature often attaches a negative connotation to the rise of derivatives markets, especially futures contracts, and many of the research studies their dangerous effects on agricultural markets (Ghosh, 2010; Cheng & Xiong, 2013; Bargawi & Newman, 2017).[4] I do not adopt this normative approach. My goal is to identify reasons for the peculiar financial underdevelopment of rice. This will sometimes imply the examination of its pros and cons from different actors' opinions, but I do not attempt to take part in the debate. Therefore, I use a definition that does not entail a value judgment in any direction.

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[3] Although he uses this concept, Hardie’s definition is unique and differs significantly to other definitions within the financialization literature. His study of the financialization of government debt is also a study of the development of bond markets. It is therefore possible to use it as a definition of financial development.

[4] This body of literature is a constituent of the study of financialization, which explores the issues related to the growth of the financial sector in relation to the real economy. Although this research does not intend to study this theme, understanding what causes the development of financial instruments in commodity markets will serve future studies on the financialization of food.

Hardie goes further in defining the process by identifying two variables – partially independent from each other – that contribute to the financial development (financialization in his words) of a market: these are the ability of individual actors to trade risk, and the ability to trade risk offered by the market structure. I adopt these variables, although what he calls financialization of the market actors and the market structure, I will call financial sophistication. It should be noted that I do not intend to use this term as a value judgement and do not imply that sophistication should be a goal to achieve. The word sophistication simply refers to the level of ability to trade risk. Moreover, when I talk about the sophistication of the market structure or a market actor through the thesis, I constantly refer to their financial sophistication.

The sophistication of an individual actor, their ability to trade risk, is determined by a set of factors including their literacy, financial education, market knowledge, access to information, and human, financial and technological resources to trade risk. The sophistication of an actor is theoretical in the sense that it is their expected ability to trade risk considering that a financial instrument is available to them. It is thus independent of the sophistication of the market structure. A market actor can be more or less sophisticated; this is not a binary variable. However, as the level of sophistication cannot be measured, I often refer to it relative to other actors: less sophisticated or more sophisticated actors. Ultimately, the level of sophistication influences the sort of instrument a market actor is able to use. Some of the least sophisticated actors will only be able to use the most basic form of instruments, such as forward contracts, or even no financial instruments at all. The sophistication of an actor can both increase and decrease. Although elements such as financial education can hardly be lost, an actor can, for instance, regress in its financial resources to trade risk.

The sophistication of the market structure represents the opportunity given to market actors to trade risk. It is determined by the availability of financial instruments for the actors of this market. As previously mentioned, for commodity markets, these financial instruments mostly come in the form of derivative contracts (forwards, futures, swaps and options). The contract specifications determine the range of situations in which they can be used. However, their final use or not by market actors is, in theory, not relevant to the sophistication of the market structure. The market structure of a commodity market can be:

- *Unsophisticated*: there are no derivative contracts available for the specific market considered.
- *Partially sophisticated*: the market has one or more form of derivative contracts that can cover certain varieties and qualities of the commodity, and is not presently evolving towards including more varieties or qualities.
- *Sophisticated*: the range of derivative contracts offer the possibility to hedge or speculate upon most varieties and qualities of the commodity. This includes consistent price spreads between the varieties and qualities, making it possible to hedge against a benchmark. In this case, a market structure could be understood as sophisticated. The degree of sophistication of the market structure could still increase if additional types of derivative contracts are introduced for varieties that are already covered by derivatives.

The financial development of the market is a function of the sophistication of the market participants and the sophistication of the market structure. Due to the variety of factors influencing these two variables, it is unlikely that the market itself will be absolutely underdeveloped or fully developed. Therefore, the market can be described by its level of financial development. This level can be changed by:

- An increase or decrease in the number of highly sophisticated actors.
- An increase (or less likely decrease) in the level of sophistication of some actors.
- The introduction or withdrawal of a type of derivative contract.
- The introduction or withdrawal of certain contract specifications.

It is important to remember that financial development is not necessarily a linear dynamic, always going forward, and that a reversion of the process can be observed. Phenomena of retreat of derivatives trading or temporary financial development are not historically uncommon on the rice market, with the disappearance of many futures contracts.

The financial development of the market combines the sophistication of different market actors and the sophistication of the market structure, making any precise numerical measurement of the level of financial development of the market difficult. The best indicator of an agricultural market's financial development is the liquidity of its derivatives markets. The more financially developed the market is, the more liquid its range of derivative contracts are expected to be. The data for the liquidity of futures markets, represented by open interests and volumes, are publicly available. It is not the case for most types of OTCs, for which empirical knowledge of market participants must be trusted to understand the liquidity level in the market.

The concept of *financial development of commodity markets* is therefore linked to the concept of *development of derivatives market*. This, whether financial or commodity derivatives, is discussed in many academic papers. However, there is no consistent definition of what development means, nor is there even an explicit definition. Basu and Gavin (2010) use the term growth instead of development. They approach the phenomenon as an increase in commodity derivatives trading that is faster than the growth in commodity production. Sundaram (2012) also uses the concept of growth, and measures it by the total value of derivatives markets. Using the concept of development of derivatives explicitly, Shamsher and Taufiq (Shamsher & Taufiq, 2008) articulate it in two stages: (1) the existence of derivatives instruments and (2) the liquidity of the market. Riederová and Růžičková (2014) do not define precisely what they call development of derivatives, only mentioning the increase in their prevalence. However, they attribute the development of derivatives markets to the historical evolutions of their underlying assets. Kuzman, Ercegovac and Momčilović (2018) discuss the development of Serbian derivatives markets with regards to exchange instruments, trading volumes and number of market participants, but without clearly defining development. Fernandez (2003), when discussing the development of derivatives markets in Latin America, does not define the concept either, but uses notional amounts – a measure of market size – as the indicator for development. Some other authors have discussed related concepts with deeper conceptual differences. For instance, Kroszner (1999) studies how derivatives have developed in the sense of their adaptation to constraints such as credit risk and regulatory frameworks. He focuses more on the organisational development of futures clearinghouses than on the development of markets. Pennings and Muelenberg (1999) study not the development of commodity derivatives but their developing instead, thus taking the point of view of an exchange attempting to succeed at introducing a contract.

Although this literature on the topic is relevant to this thesis and my conclusion will engage with the takeaway of some of these studies, I prefer referring to the financial development of commodity markets than to the development of derivatives markets because it allows me to keep the physical market as primary object of study. First, that allows me to look at the possible risk management of all physical market participants, whether they are sophisticated or not. Second, within the physical market for one crop, multiple derivatives markets can co-exist. I am therefore interested in the reasons allowing a crop industry to increase its use of derivatives contracts, rather than the growth of one derivatives market in particular. Finally, some forms of derivatives trading do not exactly fit the concept of derivatives markets. For instance, two physical market participants could trade a forward contract[5] without the existence of a broader market for these instruments, but that would constitute a first degree of risk trading within the industry.

II) Overview of the global rice market

As suggested in the opening paragraph, rice is a key market for millions of people throughout the world, especially in the Global South; the grain is known to characterise the agricultural system of Eastern Asia, from Pakistan to Japan, and it is also a major staple in the Middle East and sub-Saharan Africa. In this section, I intend to provide a first snapshot of the rice market that will facilitate discussion throughout this entire thesis.

a. Geography of the rice market

In terms of a geographical description of the rice market, there is a clear imbalance of the importance of rice between developed and developing countries. Unlike most other major commodities, the West is not a dominant player in the trade of this grain. Italy and the USA are the only significant Western countries in the global market, as they export significant volumes. None of the important importers is found in the developed West. As for other developed countries, Japan and South Korea still have an important rice culture today (Franks, 2015). However, their protectionist policies, which make them produce their own rice and avoid all exchanges with foreign nations, isolate them from the world rice market (Les Echos, 2014). Rice is thus characterised by its South-South exchanges. To qualify this phenomenon, I will use, in this thesis, the concept of unipolarity of the rice market, representing its concentration in developing countries.

[5] See section IV of this chapter

With rice, being a large producer (as a country) and a large exporter is not correlated. China, Indonesia and the Philippines are within the top 10 of the largest production, but still face shortfalls to their needs and are consequently some of the largest importers of rice. Conversely, Uruguay is a minor producer, but exporting all of its production allows the country to enter the top 10 of the biggest exporters. Globally, rice exports are dominated by India and Thailand, which hold about 50% of the international market, closely followed by Vietnam (USDA, 2019). The exports are strongly concentrated in the hands of a few countries, while imports are more evenly distributed. Other than these three big producers previously mentioned, important importers include Iran, Saudi Arabia and Nigeria (USDA, 2019). One key feature of the world rice market is the stability of export channels between countries. One exporting country usually holds stable shares of import markets of another country from one year to the other. For instance, a lot of the exports of the two giants of Maritime Southeast Asia – Philippines and Indonesia – comes from Vietnam.

	Producer		Consumer		Exporter		Importer	
1	China	*142,274*	China	*143,553*	India	*11,202*	China	*3,170*
2	India	*115,805*	India	*101,271*	Thailand	*10,095*	Philippines	*1,747*
3	Indonesia	*38,516*	Indonesia	*36,433*	Viet Nam	*4,727*	Benin	*1,727*
4	Bangladesh	*36,274*	Bangladesh	*35,367*	Pakistan	*4,059*	Iran	*1,444*
5	Viet Nam	*28,961*	Vietnam	*21,317*	USA	*3,552*	Côte d'Ivoire	*1,394*
6	Thailand	*20,811*	Philippines	*13,883*	Myanmar	*2,471*	Saudi Arabia	*1,272*
7	Myanmar	*17,873*	Thailand	*11,700*	China	*2,011*	Senegal	*1,119*
8	Philippines	*12,708*	Myanmar	*10,283*	Brazil	*1,049*	Iraq	*1,081*
9	Brazil	*7,702*	Japan	*8,450*	Uruguay	*931*	South Africa	*1,039*
10	Pakistan	*7,358*	Brazil	*7,433*	Italy	*716*	Indonesia	*1,001*

Table 1: Top 10 producing, consuming, exporting and importing countries of rice, (000 metric tonnes)

I extensively discuss the mechanisms of the world market; however, it is essential to note that this represents only a small share of the rice industry. Most rice is consumed in the country where it is produced (Latham, 1998). Producing countries consume their own rice and export the surplus to countries that either do not produce or are not self-sufficient. The world rice market is, therefore, only a surplus market. Domestic markets are very significant within the industry. Over the past decade, the share of rice traded internationally increased from 7% to 9% (Timmer, 2012; Jha, Kubo, & Ramaswami, 2016). This is a significant increase, but these numbers should be compared to other agricultural goods where international trade usually represents 30% to 70% of the market.

b. Profile of a diverse grain

To understand the rice market, understanding the grain is also necessary. Rice is a product that is usually consumed as such, rather than as a transformed product. In this way, it differs from a product like wheat, for instance, that is turned into pasta or bread. Nevertheless, rice can be traded at three stages of its processing: paddy (also called rough rice, which is unmilled rice), brown rice or white rice. For instance, most of the paddy traded will be conducted between farmers and millers.

In addition to the diversity of possible milling processes, rice is a highly heterogeneous grain in nature. First, rice is divided in two main varieties, the long-grain Indica rice, and the short-grain and medium-grain Japonica. Long-grain rice grows in warmer climates and is, therefore, more common in the latitudes closer to the equator, while Japonica grows better in colder climates, making it popular in more northern latitudes and the highlands of tropical countries. Traditionally, Japonica is consumed in Northern China, Korea and Japan, while Indica is popular in the rest of Asia. Japonica is also a more expensive crop but is not heavily traded internationally as its consuming countries are self-sufficient. Most of the Japonica globally traded is for sushi rice, with California being the main supplier. Within the long-grain rice industry, white Indica is the most common variety. However, there exists some fragrant varieties such as basmati and jasmine rice (of which Thai Hom Mali is the highest quality), which are sold at a premium. Beyond the variety, two other criteria matter for rice, which fragments the market further. One is the quality (or grade) of the rice. This is calculated by measuring the amount of broken grains during the milling process. Rice will therefore be graded by the percentage of broken rice. The other criterion is the origin. It is a factor that is prevalent in the value of a rice lot. For instance, Thai rice is usually worth more money than Vietnamese rice for an equivalent grade. Although this will not be specified in the name of the rice, many other criteria are examined to assess rice quality, such as the moisture or the number of black and red kernels in a specific amount of rice (see appendix A). Overall, the complexity of grading in rice – unlike soy or corn, for instance – makes for a poorly integrated market as all origins and grades are priced very differently.

III) Risk exposure

As derivative contracts are the subject of the thesis, and those instruments serve the purpose of risk management, the concept of risk should be discussed first. The notion of risk in agriculture is complex because it takes various forms and consequently does not accept a single definition. The simplest definition that can be adopted is that risk is the probability of an outcome differing from the expected outcome at the time of decision-making. In economic terms, risk can be understood as the probability of a loss of utility by an economic agent.

When discussing one risk, several components of risk must be considered, including the nature and source of the risk, the risk for whom, the risk preference of the agent, and if it is an individual risk or systemic risk.

Hardaker et al. (1997) have listed the main risks affecting farming activities. *Production risk* is rooted in the unpredictability of agricultural output due to different factors such as climatic conditions and the performance of the crop, exposure to diseases or bugs etc. *Price or market risk* is the unpredictable change in the prices of inputs and outputs between the decision-making and the cash transfer. New laws or regulations, the transformation of subsidies schemes or taxation related to a change in government or public policy reorientation can be classified as *political risk*. *Sovereign risk* is related to action by a foreign government, such as the non-respect of a trade agreement. *Contractual risk* (Hardaker et al. name it relationship risk) derives from the potential breakdown of an agreement by any agent part of the supply chain. Political, sovereign, and contractual risks constitute together *institutional risk*: the exposure to unpredicted change in an expected long-term social structure. *Human or personal risks* define major life crises (death, illness, divorce) of any agent of a business that may threaten the sustained activity of this business. Together, all the types of risks listed above form the so-called *business risks*. They are the risks inherent to the business activity that threatens its profitability.

In addition to business risks, *financing risk* (Hardaker et al. name it financial risk) defines all type of risk related to the way an agricultural activity is financed. Especially as borrowing involves repayment with interest rates, financing risk is seen as a multiplier of business risk.

Although these risks are often presented, in the agricultural economics literature, as affecting farmers, they are also a concern for most other actors in the subsequent supply chain. For instance, production risk can expose a processor to a disruption of the supply they need to fill up their processing capacity. Just like farmers and processors/millers, traders and exporters are also exposed to market risk and institutional risk. The first one affects their income while the second threatens the viability of their business. Howerver, I will show through this thesis that the trading mechanisms used by intermediaries and their respective market power influence the extent to which market risk will affect their income.

In this thesis, I focus on price/market risk and the way it threatens income security of market participants, especially farmers, processors and traders. However, other types of risk such as political risk are also likely to trigger market risks by creating market reactions and therefore, price shocks. Importantly, some types of risk can have an impact on income, depending on whether an individual shares them with others or not. Production risk is a good example. If a small group of farmers is the victim to a flood, their loss in production is unlikely to affect market prices. These farmers will consequently suffer a loss in income because they have a very small crop to sell at the normal market price. In a second situation in which a drought affects the entire production of a country, the whole market would be affected, but the decline in production (and therefore crop to sell) should be in part compensated by a rise in prices. Tomek and Paterson call this a “partial natural hedge” (2001, p. 967). This example illustrates that producers can be exposed to two types of risks: the ones that are applied on an individual level, and the ones of a systemic nature.

There is a theoretical debate about whether or not all price movement constitutes price risk, from an individual point of view. Tomek and Paterson note “the commonly used risk measure includes both upward and downward deviations from the mean, but perhaps only downward (upward) deviations are relevant to farmers (processors)” (2001, p. 958). Other authors suggest that “price risk can be defined as the difference between the expected price and the actual price of the commodity” (Banterle & Vandone, 2013, p. 530). Therefore, this suggests that any uncertainty in price is a risk as it affects decision-making (Mohan, 2007). An underestimation of future prices at the time of decision making on planting can be reflected in a loss of utility at the time of sale. This is more consistent with the original definition of risk I adopted earlier. The multi-directionality of market risk is also important because to attract investors and consequently liquidity in hedging markets, there is a need for both potential loss and profits. Finally, this approach allows for understanding the risk of the market as a whole, not only farmers. It is useful as the uncertainty of traders could also contribute to market instability, for instance, and therefore generate more risk. This is why both upward and downward price movements could be useful in the analysis.

IV) Types of commodity derivative contracts

To manage price risk, many market actors use derivative contracts, allowing them to sell this risk to a different actor. The seller of the price risk is risk-averse, while the buyer is a risk seeker. In this section, I briefly review the most common derivative instruments available to market actors as understanding their basic mechanisms will facilitate discussion throughout the thesis.

a. Forwards

Forward contracts (Figure 1) are non-standardised (made *ad hoc* for each trade) derivative instruments. They are the simplest form of derivative contracts. A forward contract is an agreement, between two parties that are in successive positions in the supply chain (for instance a farmer and a miller, or a miller and a trader), to trade at time t a given quantity of a commodity for a fixed price agreed at time t-1. By doing so, the seller (called short) secures a fixed income, while the buyer (called long) fixes its cost. However, if the buyer is only an intermediary in the supply chain (not the final user), they might offset this long position with a subsequent short position. Otherwise, they will assume all the market risk. The commodity agreed to change hand at time t may, but does not have to, exist at t-1. As forward contracts are made *ad hoc,* specifications (the quantity, quality of the grain, delivery point, date of delivery etc.) are decided and agreed (customised) by the two parties engaging in the transaction at t-1.

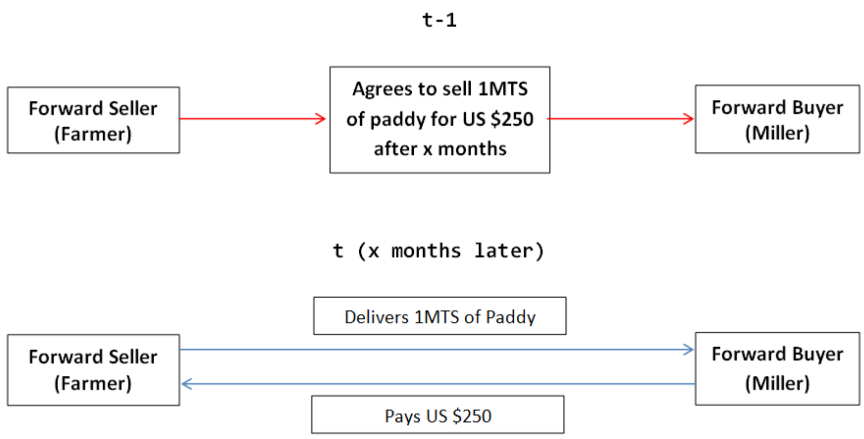

Figure 1: Forward contracts

Forward contracts present a few major disadvantages. Firstly, in the case of market opacity, it can be difficult to price a forward contract. More importantly, it is difficult for a market actor to be sure his counterpart will respect the terms of the contract. Depending on the existence of enforcing mechanisms, the benefit of hedging of price risk can be cancelled by the resulting contract/counterparty risk.

b. Futures contracts

To avoid the disadvantages of forward contracts, futures contracts help create transparency and guarantee enforcement of contracts. Just as a forward contract, a futures contract is an agreement between two parties to buy and sell a commodity at a later date. Unlike forward contracts, futures contracts are a type of standardised derivative contract. A commodity exchange sets a standardised contract with clear specifications for the commodity. At a time t-1, a futures seller enters the short position of the contract, engaging to deliver the quantity of the commodity specified by the contract (also called *contract unit*). In exchange, he will receive at expiration (*maturity*) time t the price P-1 of the contract at t-1. This inflow of money is brought by a futures buyer who enters the long side of the contract and is in theory guaranteed, in exchange, the delivery of the commodity at expiration time t.

I present in Figure 2 the functioning of a futures contract.

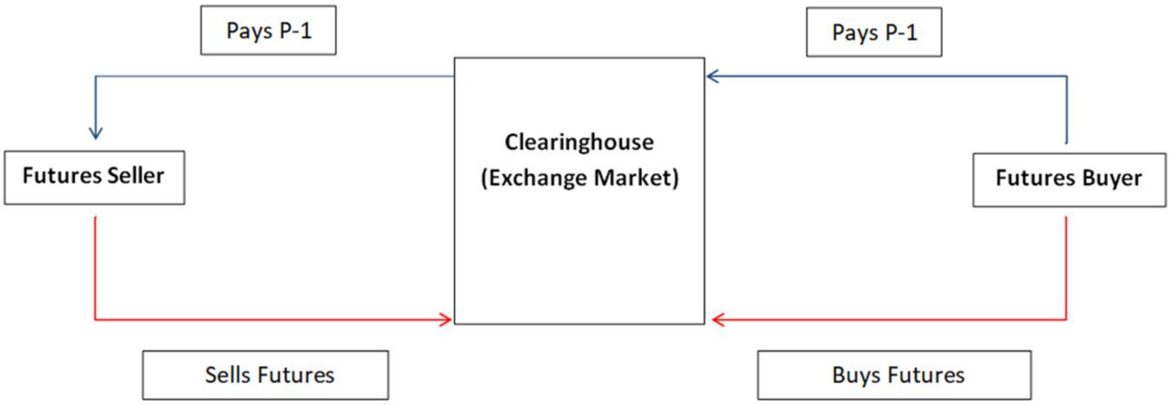

Figure 2: Futures contracts

In reality, most shorts and longs do not take part in physical delivery through the exchange. When available, market participants prefer a different type of settlement called cash settlement to physical delivery. This requires one of the two parties to transfer the difference between P-1 and P to the other party. In a situation where a futures contract for a tonne of a commodity is sold at t-1 at a price P-1=$400, there are two possible cases at t: the price at expiration is higher, e.g. P(1)=$450; or the price at expiration is lower, e.g. P(2)=$350. In case (1), the seller pays the difference $450-$400=$50 to the clearinghouse which later pays the buyer, while in case (2) it is the buyer who pays the difference $400-$350=$50 to the clearinghouse, which itself pays the seller. By making the transaction between market participants indirect, the exchange removes counterparty risk. Even if the cash settlement option does not exist at expiry, all participants have the option to close their position by entering an offsetting transaction, i.e. buying a contract if they previously sold one and *vice versa*. Many participants will do so shortly before contract expiration (when futures and cash price are converging)[6] to avoid having to deliver.

A significant consequence of this system of cash settlement and the possibility to offset a contract is that physical market participants are not the only ones taking part in the market. Both *hedgers* and *speculators* can take part.[7] When the contract is settled financially or the position is close, the gain or benefit to the hedger should be offset by

[6] See below
[7] Through this thesis, I argue that not only can they both take part, but they are also necessary for the success of derivative markets.

the physical position held by the hedger. For instance, if a farmer was the seller of the contract in case (1), he sells his crop for $450 on the cash market at t, but must refund $50 to the buyer of the futures contract. His net benefit is, therefore, $400, which is the price he hedged with the futures contract. On the other hand, a speculator has no physical position in the crop market and simply takes the risk of making a profit while being exposed to a loss. Speculators are important because they allow diverting price risk outside of the market, where most physical participants are risk-averse.

Several fundamental concepts surrounding futures contracts must be understood prior to the study of derivative trading. I briefly introduce them here to facilitate discussion later in the thesis. Other more specific technical concepts will be introduced in subsequent chapters when they are needed.

Contract specification: When an exchange creates a new futures contract, a fundamental step is to decide on contract specifications (contract specs). Specifications are determined with the objective of attracting the maximum market participants. These include details such as the grade of the commodity, the contract size and details of the delivery mechanisms. I list in Appendix B the specifications that usually appear for any listed contract.

Open Interest, Volumes and Liquidity: Open interest (OI) represents the number of contracts (commitments of traders, or total number of short positions) open at any one time on a futures and options market. Volumes represent the number of contracts traded over a given period. Liquidity is the ease of getting in and out of a contract. That is to say, to find a matching offer to a bid and *vice versa*. Volumes are the best measure of liquidity, although OI can serve this purpose for some contexts discussed in this thesis.

Basis: The difference between a local cash (spot) price of a commodity and the price of a specific futures contract for the same commodity is called the basis. This difference is expressed in cents. It is calculated as follow:

Local cash price – futures price = basis

For instance, if the cash price of rough rice in Crowley, LA is $12.50 per hundredweight (CWT) at a certain date in May, and on that same date the price of the July Chicago rough rice contract (which is the nearby contract) is $12.30, then the Crowley basis is

20 over. If the price in Crowley was $12.10, then the basis in Crowley is 20 under. If the cash price is referred in relation to a distant contract, such as November in the original example, and the price of the November contract is $11.90, then we would say that the basis is 60 over November.

Many factors influence the basis at a precise location (CBOT, 2003):

- transportation costs
- local supply and demand conditions, such as grain quality, availability, need, local weather
- interest/storage cost
- handling costs and profit margins

Convergence of cash and futures prices: If a contract functions correctly, it is expected that the cash price at the delivery point and the price of the futures contract converge ahead of the delivery period until they become equal close to the delivery date. This mechanism is due to the possible arbitrage between the two prices in the delivery month. If the futures price is lower than the cash price, buyers of the commodity would buy the futures and take delivery of it, as this is the cheapest source of supply for the commodity. The growing demand for the futures drives futures prices up, therefore triggering convergence of the two prices. If the futures price is higher than the cash price in the delivery month, then there is an incentive for market participants to buy the commodity in the cash market at a low price and sell the futures contract and make delivery at a higher price. These increases in the demand in the cash market and supply in the futures market drive cash prices up and futures prices down. This also results in the convergence of prices.

Terminal markets: The last notion I want to introduce is terminal markets. I name terminal markets futures markets that have the function of externalising the risk from inside an industry to outsiders, specialised in risk trading. For instance, a forwards contract is usually an agreement between two participants of the physical market. When hedging, they must enter into offsetting trades to effectively lock in prices. If a miller enters a forward contract with a farmer, he must enter another contract with a different party to cover his long position on the first contract. Otherwise, they will assume the risk of a price fall through which he could pay more for procuring the rice through the forward than he would receive for selling the rice cash after milling. The issue is that most actors in the industry are risk-averse and are reluctant to carry the risk of not offsetting. As the chain of forward contracts cannot continue forever along the supply chain, risk needs an escape door to be taken by speculators, often exogenous to the industry. This is possible with liquid futures markets. That is why I call these terminal markets.

c. Other derivative contracts

Through this thesis, I will discuss other types of derivative contracts. These will mostly be grouped under the denomination Over The Counter (OTCs) contracts. This means that they are not publicly listed through an exchange. Forward contracts are the simpler form of OTC contracts. However, in commodity markets, there is a wide variety of possibilities to make OTC contracts tailored to the needs of market participants. This can include, for instance, complex pricing mechanisms of the contract over time. I will explain the details of these contracts when they are useful for the discussion.

The other major types of derivative contracts that have their importance in commodity markets is options. These are either based on futures contracts or are OTCs for which one of the party has the option, but not the obligation, to execute the transaction (whether buying or selling the underlying commodity) before or at expiry. When buying the option, the holder of the option pays the seller a premium that is priced upon the risk related to the price of the underlying commodity. This form of contract is close to the mechanism of insurance.

V) Financial development of agricultural commodities

As mentioned early in this introduction, the futures contracts for agricultural goods on American exchanges traces back to the late 19th century. It started with grains such as wheat and corn in Chicago in 1877 and the futures for soft commodities (coffee and sugar) followed in New York five years later. The lack of historical accounts limits the ability to describe the dynamics of sophistication of the then market structure and the market actors. What can be said is that the concept of risk trading has only grown from here, with some particular episodes contributing to the expansion of derivatives trading. For instance, in the 1980s, the Reagan-Thatcher wave of neoliberal policies led to the liberalization of food markets, in part forced on developing countries in exchange for the bailing out by international financial institutions (IFIs) of their debt generated by the oil crisis of the 1970s. Liberalization resulted in more risk to be hedged, increasing the popularity of derivatives trading. Futures contracts were also understood as a policy instrument to support export prices and stabilise revenues (Thompson, 1985).

Even if it is complex to fully track the process of the financial development of food markets, it is possible to present the current picture of this development. Most major agricultural markets (such as corn, wheat, cocoa, sugar, soybeans, coffee, rubber, etc.) have heavily developed derivatives markets. To illustrate the importance of finance in these markets, I list in Table 1 the main futures contracts available for the different commodities I will look at in my thesis.

Coffee	Chicago (CBOT), NY (ICE), London (ICE), Addis Ababa (ECX), Osaka (ODE), Sao Paulo (BM&F BOVESPA)
Sugar	NY (ICE), Chicago (CBOT), Mumbai (NCDEX), Sao Paulo (BM&F BOVESPA), Osaka (ODE), Zhengzhou (ZCE)
Wheat	Chicago (CBOT), Kansas City (KCBT), Minneapolis (MGEX), London (ICE), Addis Ababa (ECX), Zhengzhou (ZCE)

Table 2: Main futures contract for coffee, wheat and sugar

The existence of a contract is not in itself evidence of a highly financially developed market; the contracts must also be traded actively. Figure 3 and Table 3 therefore presents the volumes and open interest of futures contracts in a single trading day for coffee, wheat and sugar on their main trading market, as well as for rice, for comparison purposes. These are expressed in Metric Tonnes to account for the various contract units of the different contracts. It also presents the volumes produced globally in 2019 and compares it to the volumes present on financial markets (materialised by Open Interests). While the volumes of coffee financially traded are significantly lower than for sugar and wheat, this only reflects the smaller production of this crop. The ratio of production to financial trade is actually the highest in coffee. In comparison, only a fraction of the global production of rice is traded in Chicago.

This is only illustrative of how widely traded these commodities are on their main market. Some of their secondary futures markets can also be liquid, indicating an even greater degree of financial development. The use of derivative instruments has become, over the past century, an integral part of the business on these markets and the actors' level of sophistication usually matches the high sophistication of the market structure. OTC contracts are also very prevalent in these markets, although their decentralised nature makes the measurement of their use impossible.

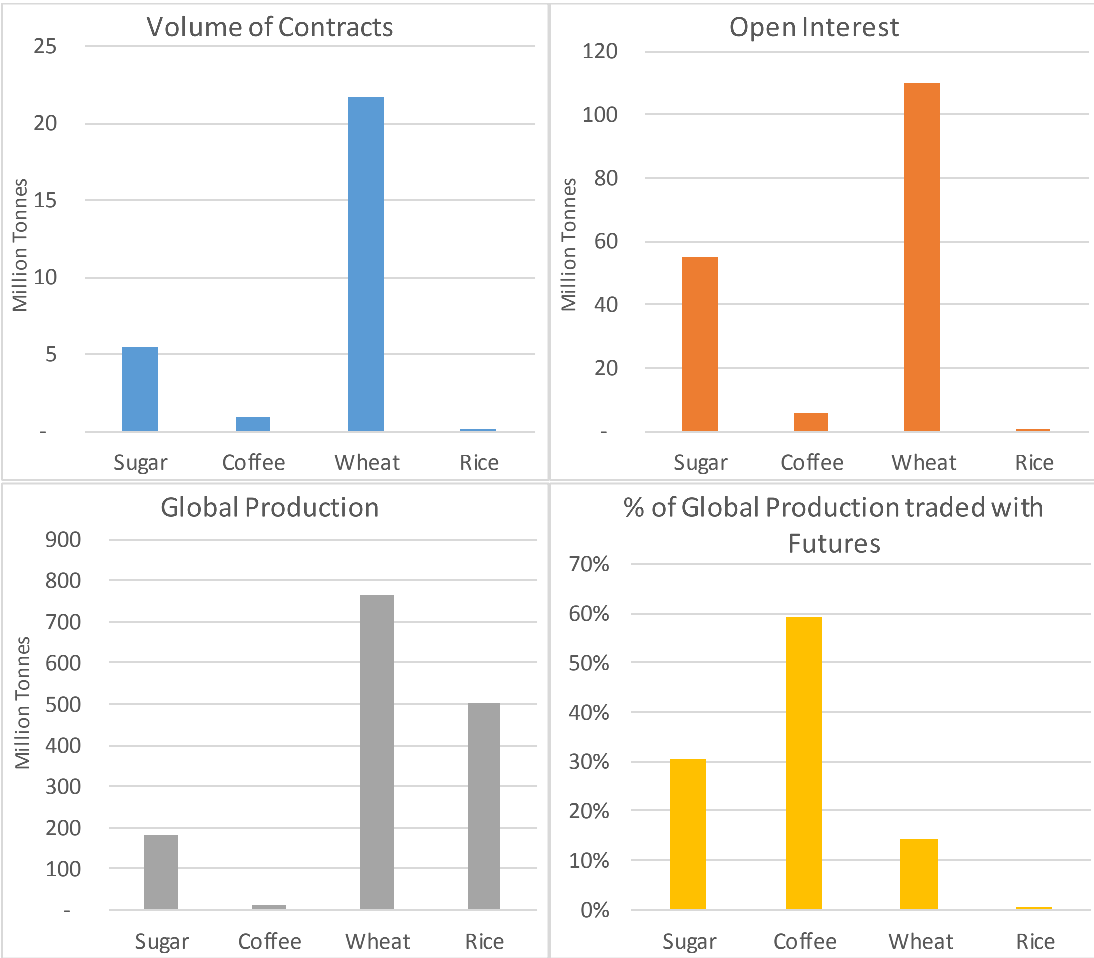

Figure 3: Volumes traded for selected futures contracts[8] on the 30th of April 2021 vs. 2019 global production[9]

[8] Major futures contracts for each crop have been compiled and expressed in Metric Tonnes, depending on the contract size. These contracts are the ICE Sugar No. 5, No.11 and No.16 for sugar; ICE Coffee C and Robusta contracts for coffee; CME Chicago, Kansas City and Black Sea Wheat as well as Euronext Milling Wheat for wheat, and CME Rough Rice contract for rice.
[9] Production data from USDA, futures data from Barchart.

30th of April 2021	**Sugar**	**Coffee**	**Wheat**	**Rice**
Volume	5,437,520	876,671	21,702,446	39,403
Open Interest	54,782,813	5,940,319	110,144,302	826,644
Global Production 2019	180,000,000	10,035,576	765,769,635	503,901,025
% of Global Production traded with Futures	30.4%	59.2%	14.4%	0.2%

Table 3: Volumes traded of selected futures contracts[7] on the 30th of April 2021 vs. 2019 global production[8]

VI) History of rice futures markets

The history of futures contracts is not one of constant underdevelopment and unsophistication of the market structure. There is a past of functioning derivative trading for this grain, but also of various failures more recently. Presenting this historical background will facilitate discussion in the subsequent chapters.

a. Dojima Futures Market:

Futures trading in rice finds its origin at the end of the Tokugawa-period in Japan (also called Edo-era, 1603-1868). This also marks the birth of derivative finance. Rice traders in Osaka then speculated on the price of rice in an unstructured way that was assimilated to gambling (Moss & Kintgen, 2010). With time, and in the context of alternating policies of ban and authorisation,[10] the market slowly formalised to become the Dojima exchange by the end of the 1720s (Moss & Kintgen, 2010) . Rice bills, that were warehouse receipts, started being highly used in Osaka, making the trading of futures possible once those rice bills were standardised (Schaede, 1989). An exchange – in the form of an association of traders, clearing houses – in charge of changing rice into money and keeping merchants' deposits, as well as book-keeping of all transactions, contributed to the sophistication of the Dojima futures market (Schaede, 1989)

[10] I discuss these policies in detail in Chapter V

The Dojima market was highly organised and Schaede (1989) demonstrates that it satisfied most of the necessary components of a modern futures market:

> (1) only exchange members can participate in the market;
>
> (2) contracts traded are standardised;
>
> (3) for each position, a 'good-faith' money (margin) has to be deposited at the clearinghouse;
>
> (4) trading is not bilateral, but the clearinghouse enters each transaction as a third party and guarantees the fulfilment of all contracts;
>
> (5) the contract runs for a certain trading period and open positions are reassessed daily in accordance with price fluctuations (mark-to-market); and
>
> (6) positions dissolved before the end of the trading period are cleared by cash settlement.
>
> … the Dojima market practices generally satisfied these criteria except that it had different margin rules, different mark-to-market mechanisms,[11] and several clearing houses (Schaede, 1989, p. 488).

The careful recording of market data at the time have made possible many recent econometric analyses to determine whether the market was efficient. Hamori et al. (2001) explain that Miyamoto (1988) concludes that the market was efficient based on the correlation between spot and futures prices between 1757 and 1826. They later expose Ito's work (1993) that concludes the opposite for the period between 1763 and 1780, based on (1) the impossibility to estimate the spot price at contract expiration from the futures price at the beginning of the contract; and (2) the absence of convergence between spot and futures prices at maturity (Hamori, Hamori, & Anderson, 2001). Using similar efficiency conditions to Ito, Hamori et al. examine two sets of data, between 1763 and 1780, and from 1851 to 1864. They conclude that the market was efficient in the first period, under a stable political environment, but became inefficient in the second period in the context of political turmoil[12] (Hamori, Hamori, & Anderson, 2001).

Certain patterns make the Dojima market intriguing and different from modern commodity futures markets. Considering it as a commodity exchange is already a

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[11] The mark-to-market is the measure of the fair price value of the asset at a current time.
[12] See Chapter V

strong statement. In this era, rice in Japan was not only a staple but also a currency, a mean of payment and taxation. Schaede thus argues that the Dojima market was rather a securities exchange, with little connection to the underlying commodity that should be considered as money (Schaede, 1989).

However, Wakita (2001) defends a very different argument and finds that each seasonal market had a well-defined function for agricultural trade. Trading in rice futures then, unlike trading in the present-day futures market, was conducted in three seasonal markets:

1. The spring market: January 8-April 28 (called ``winter trading'' along with that in the below autumn market).
2. The summer market: May 7-October 9 (called ``summer trading'').
3. The autumn market: October 17-December 24 (called winter trading).

The summer market seems to have primarily catered to the need for hedging against the risk of an unsatisfactory harvest; whereas the primary function of the autumn market opening shortly after the harvest may have been to facilitate hedging against the risks of shipping harvested rice to Osaka and determining the quantity that would actually be shipped. The spring market, on the other hand, can reasonably be characterised as the market for transactions of the rice already stored in Osaka as well as the additional shipments of rice from the colder Hokuriku districts, which usually arrived in April (Wakita, 2001, pp. 538-539).

The Dojima market came to an end in 1939 when it was absorbed by the Government Rice Agency to maintain stable prices by controlling production (Frédéric, 2011; Whipp (a), 2011).

b. Futures Trading in early 20th Century Burma:

In 1900, a rice futures contract was established in Rangoon, the then capital of British colonial Burma, which was considered the Asian rice bowl at the time. It lasted during the first half of the 20th century. The market seemed to be institutionally well settled. The contract could specify delivery in one, two, three or six months (Cheng S. H., 2012). The contract had a well-defined standardisation, with only one grade tradeable through futures contracts: the so-called *Small Mills Specials*. The market was not trading in paddy, which meant the main actors using the futures market were millers and exporters, alongside investors trading futures for profit (Cheng S. H., 2012). Cheng describes ways millers could use the market to deal with certain businesses such as forward agreements:

> If a miller contracted to deliver rice in a few months to a buyer and had not yet bought paddy to mill and if he feared that the price of paddy was going to rise the miller could buy futures rice from speculators so that he could be sure of fulfilling the contract without loss (2012, p. 76).

It seems that the price behaviour of this futures market was coherent. Futures prices were slightly lower than spot prices and both converged towards delivery, with seasonality sometimes affecting this gap. This is the sign of a well-functioning market (Latham, 1986; Cheng S. H., 2012). Despite rudimentary infrastructure and the contract being directly traded from the pavement of Mogul Street, the Rangoon market seemed institutionally well constructed and well-functioning (Latham, 1988; Cheng S. H., 2012).

The emergence of futures trading in Burma seems to be explained by the growing financial cultures in Europe at the time. Colonial trading companies from Liverpool, London, Hamburg and Bremen were established in Rangoon and may be responsible for the creation of this futures market (Latham, 1986). The colonial hypothesis is reinforced by the existence of a futures market in Saigon (French Indochina) from 1907, while Bangkok, then capital of the independent Kingdom of Siam, where Chinese merchants mainly operated, did not use futures trading (Latham, 1986). The market seems to have lasted until the Second World War, but no clear end date is available.

c. Futures Contracts Attempts in the late 20th century:

The second half of the 20th century has been characterised by a multitude of attempts to establish rice futures. This revival came from the West – in countries' with economies developing financially where rice is of lesser socio-economic importance than in Asia. After a failed attempt to create a rice futures contract in the New York Mercantile Exchange in 1964, the emergence of rice futures in the USA came during the 1980s under the presidency of Ronald Reagan and its strong policy of liberalisation (The Journal of Commerce, 1986). The first one was established in New Orleans in April 1981. The location was strategic as the city is the main port for exporting American long-grain rice grown in the southern states of Louisiana, Texas, Mississippi and Arkansas. The New Orleans Commodity Exchange was created specifically for rice futures trading and the only other commodity traded, in very small volumes, was cotton. Both milled rice contracts and rough rice (paddy) were traded on the market (The New York Times, 1981). Thomas Webber, the president of the NOCB, was very ambitious at the opening of the market, "[predicting] daily futures trading of between $600 million and $1 billion by midsummer" (The New York Times, 1981). However, by midsummer, the disillusion was already clear, with an underperforming market and Mr Webber already replaced by a new president (Sloane, 1981). An article in *The New York Times* described the situation: "The New Orleans exchange, which trades in rice and cotton futures contracts, began operations just four months ago during an industrywide slump, and has gotten off to a sluggish start" (Sloane, 1981). This agricultural depression carried on in the USA in the following years, leading to the market's liquidation in June 1983 due to the low volume of contracts traded (The New York Times, 1983). In order to keep the futures alive, the commodity exchange was merged with the MidAmerica Commodity Exchange (MidAm) and moved to Chicago. Despite this deal, the contract did not meet more success and was closed a year later in 1984 (Latham, 1998).

Strengthened by its new affiliation to the Chicago Board of Trade, giving access to its investor members and supposedly more liquidity, MidAm and its subsidiary, the Chicago Rice and Cotton Exchange initiated another attempt two years later. A new contract, for rough rice only, was established in August 1986. The year 1987 created new hope in a long-term performing contract as a drought during the Monsoon season in India and Thailand contracted world production and consequently boosted American prices. The price of futures contracts went from 5 to 10 cents a pound between August and October 1987 (Jouzaitis, 1987). However, this contract joined the long list of rice futures failures, and the Chicago Rice and Cotton Exchange was vacated in November 1991 (US Commodity Futures Trading Commission, 1991). The CBOT picked up this contract to convert it into its own rice futures the following year, in 1992. This contract is still traded (although in relatively low volumes), covering U.S. southern long-grain paddy.

On the other side of the Atlantic, in November 1990, an attempt to create a rice futures market on the London Futures and Options Exchange (Fox) did not meet much success (Latham, 1998). The main innovation of this contract was that it targeted rice grown in another country than the one where the contract was established. The contract specification was for Thai 100% grade B rice, with a seller's option to deliver U.S. rice grade #2, 4% broken (at 5% premium). Together, these varieties represented a standard for high quality internationally traded long-grain rice. The international aspect of the contract was further demonstrated by the use of US Dollars on this market (LRBA, 1990). Shortly before the planned opening of the futures market, a circular from the London Rice Broking Association (LRBA) stated:

> It is hoped that the rice industry, including exporters, importers and traders, will use this market for protecting themselves against adverse price movement and for assessing the day to day business operations. The business will be transacted by a computer screen matching system which would remove the need for open outcry markets such as those currently thriving in Chicago and elsewhere (LRBA, 1990).

Even if the project was short-lived, the London rice futures is an interesting case of attempting to create a futures market essentially designed for international trade.

A striking fact about these past futures markets is the lack of information available despite them being part of a fairly recent history. Newman says that "many of these exchanges have now been lost to history, forgotten even by most local denizens and market participants" (Newman, 2014, p. 59). More information is generally available about their creations than disappearances and failures. This thesis attempts, when possible, to solve this issue as it will help to understand the issues specific to rice futures markets.

d. Modern rice futures markets in East Asia:

Attempts to create futures markets have geographically shifted to East Asia in recent years.

The Agricultural Futures Exchange of Thailand (AFET), established in 1999 and known for its trading in rubber, attempted to establish a futures contract or contracts for 5% broken white rice and Hom Mali rice in Thailand from 2007. A first contract, AFET BWR5, was established in March 2007 but it failed to attract trading interest and trading volumes remained very thin. The contract was essentially maintained to assist the Thai government in selling its rice stocks. It was replaced in April 2011 by another contract, the WRF5, changing the contract unit specification. While the quantity specified for one AFET BWR5 was 15MTS of rice, the WRF5 was for 50MTS of rice. This contract was not more successful in attracting trading interest. The contract became useless after the introduction of the paddy pledging scheme in October 2011, as prices became artificially stable, removing the *raison d'être* of the market (McKenzie A. , 2012).

An expert working group organised by the RSIS Centre for Non-Traditional Security (NTS) Studies met in March 2012 in Singapore. The meeting was supported by the National Security Coordination Secretariat (NSCS), Singapore. The idea was to examine the opportunity of creating a rice futures contract for the Association of Southeast Asian Nations (ASEAN) region based in Singapore, to stabilise rice market prices (RSIS Centre for Non Traditional Security (NTS) Studies, 2012). A series of papers published in the ADB (Asian Development Bank) Sustainable Development Working Papers Series were similarly examining this possibility. Singapore was chosen for a variety of reasons, such as the fact that Singapore is not a producing country, its time zone, its port and warehouses infrastructures, to ensure a well-functioning delivery. It should also be noted that it is the most advanced financial centre in the region. The call for papers has offered several very insightful works on the need for risk management tools in the rice market. Overall, many of the respondents and participants were enthusiastic about the prospect of such a contract for rice even if there were a few concerns, especially in terms of losing control of the market by traditional participants and governments to financial market forces (RSIS Centre for Non Traditional Security (NTS) Studies, 2012). In any case, most of the papers produced for this occasion conclude that, regardless of whether a rice futures contract is desirable or not, the current structure of the international rice trade does not allow for a successful futures market (RSIS Centre for Non Traditional Security (NTS) Studies, 2012; McKenzie A. , 2012; Pochara, 2012; Hamilton, 2012). The report of the meeting published in September 2012 consequently discouraged Singapore from establishing such a market for the time being (RSIS Centre for Non Traditional Security (NTS) Studies, 2012).

It is in China that new rice futures have emerged and strengthened. The first Chinese futures contract for rice was established on the Zhengzhou Commodity Exchange (CZCE) in 2008 for early long-grain rice (GOV.cn, 2008). The Chinese government took further its efforts to make rice hedging possible as it approved, in October 2013, the creation of two new futures contracts on the CZCE: one for japonica rice (started trading in November 2013) and one for late Indica rice (started trading in March 2014)

(Oryza, 2014; CZCE, 2017; China Daily, 2013; Reuters, 2013). Both of these varieties are nowadays grown in China for the domestic markets. The trading volumes of these contracts remains extremely thin, especially compared to wheat. On the CZCE, the ratio of daily volumes of rice to wheat is often around 1:500 (CZCE, 2017). It should be noted that towards the end of 2010, there was a boom in the volume of early long-grain contracts. However, this was short-lived, and at the beginning of 2011, this increased attention completely faded. McKenzie explained this phenomenon by new Chinese regulations at the time, aiming to discourage speculation (McKenzie A. , 2012).

Finally, Japan has seen the most recent attempt to establish a modern rice futures market. In July 2011, after 72 years of suspension, rice trading was allowed again with the establishment of two futures markets: the Tokyo Grain Exchange (TGE) (for Tokyo rice) and the Kansai Commodities Exchange (for Osaka rice)[13] (Japan Times, 2014). However, in the context of the Fukushima disaster, it proved difficult to build liquidity (Whipp (b), 2011; Japan Times, 2014). Due to the low volumes of contracts traded, the TGE was forced out of business in 2013 and the contracts for Tokyo rice were transferred to the Kansai Commodities Exchange alongside Osaka rice futures. The exchange was subsequently renamed Osaka Dojima Commodity Exchange (Japan Times, 2014). This was not enough to attract much more activity on the market, and the objective of trading volumes of 4000 contracts a day has never been reached. Combining Osaka and Tokyo rice, volumes rarely exceed 1000 contracts in a trading day (Japan Times, 2014; Quandl, 2017). Despite this partial failure, the exchange continued its efforts on rice by revising its strategy. The Tokyo contract was maintained as a benchmark for rice going into industrial use, while Osaka rice was withdrawn and replaced by contracts for Niigata (in 2016) and Akita (in 2019) rice that represent better benchmarks of the market for household and restaurant consumption.

[13] Regardless of the origin, all rice grown in Japan is medium-grain japonica rice. Tokyo rice are varieties grown in Tochigi, Gunma, Saitama and Chiba prefectures. Osaka rice comes from Shiga and Mie prefectures.

VII) Problem statement

An obvious empirical observation emerges: there is a fundamental divergence between rice and other agricultural markets in their history and current use of derivative instruments. This research aims to answer the following research question: *what explains the fact that financial development – materialised on commodity markets by the increasing capacity to trade risk through derivative contracts – characterises most food markets but has remained marginal in the rice market?* This puzzling fact is reinforced by the observation that since WWII, rice futures contracts are not simply almost non-existent, they have often failed. In comparison, derivatives markets have strengthened their influence on other agricultural markets. My research is thus driven by a set of additional sub-questions. Why do futures contracts fail? Do patterns of failure appear in the rice market? How does it differ from other commodity markets? How does the rice market currently manage its risk in the absence of financial hedging instruments? How have derivative markets developed in other crop markets?

VIII) Aims and contribution

The aim of my research is two-fold. The fundamental driver of this study is to provide an academic understanding of a practical issue that animates debate in the rice industry. Industry stakeholders have long been asking the question that forms the research question of this thesis. However, knowledge is very fragmented on the rice market due to secrecy, opacity and lack of integration. The research thus seeks to concentrate the market knowledge and analyse it to provide a Political Economy insight into the reasons for the financial underdevelopment of rice. The research could also have a further reaching impact as many actors believe that this is critical knowledge to make progress in terms of transparency and risk management. In addition, as my analysis explores thex structures of the rice industry, these findings can serve for a variety of other purposes when it comes to the Political Economy of rice.

The second main objective of the research is to increase the understanding of the mechanisms involved in commodities' financial development. This part of the research presents a valuable contribution to the academic theory on the topic. In particular, the research advances the debate about which major factors contribute to the success or failure of futures contracts. More importantly, I propose a specific understanding of financial development in the context of developing countries, for which the existing literature remains narrow. I thus provide a new theory of financial markets development that awards importance to the geographical chronology of the process.

IX) Hypotheses

Prior to the beginning of the data collection phase of this research, I formulated four main hypothetical answers to the research question to drive the research. These ones were produced from the existing literature, market sentiment I had captured during my time as an analyst at the LiveRiceIndex, and logical stipulations.

In the academic literature, the question is hardly studied directly. Only three authors attempted to diagnose the absence of rice futures contracts, two of whom did so concisely. In his book, *Futures and Options Markets: An Introduction*, Carter argues that the need for derivative hedging instruments is removed in rice by the "combination of government programs and the preponderance of buying and processing cooperatives" (Carter, 2007). Although his consideration of the question remains brief, Latham (1998) proposes a more elaborated set of explanations. He first argues that the vast number of varieties and qualities of rice make standardisation impossible, while it is necessary for futures contracts[14]. His second main argument is that futures markets for rice lack financing because of the disinterest from hedgers (especially Thai traders) (Latham, 1998). He states that traders are satisfied with the existing situation, making them reluctant to change their way of trading. Roche (1992) dedicated an entire chapter to discuss the potential for futures contracts for rice, and proposes four main factors to explain the absence of futures trading. He first agrees with Latham about the lack of standardisation. He also argues that the tradition of default in the industry that makes difficult to collect payment from “losers” in futures contracts (I argue in Chapter VI that this issue can affect OTC contracts but not futures). He adds that there is a lack of liquidity in countries where rice is traded. Finally, his most important argument is that price opacity profits some traders, who are, therefore, reluctant to display publicly their price expectations.

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[14] See Chapter II

The thesis aims to go much further into details in regards to the factors deterring the establishment of rice futures contracts. I formulated this set of four main hypotheses.

Developing countries hypothesis: As explained earlier, there is a strong unipolarity in rice with the trade mostly taking place in developing countries. I hypothesise that this peculiar feature could play a role in the financial underdevelopment of the market. Countries that are still in the early stage of their socio-economic development may not offer a favourable environment for futures markets. The legal framework, for instance, may be an obstacle to derivative trading, as suggested by Roche (1992). Some countries lack property rights or contract law, while others may have legal systems that do not fit the needs of Western finance. The sophistication of potential market actors may be another obstacle characteristic of developing countries. In places where financial sophistication is low in all sectors of the economy, there can be a lack of financial education and derivative trading expertise allowing for the building of liquidity. Similarly, market actors may lack the means – such as access to credit – to finance their participation in derivative trading (such as the need to manage margin calls). Finally, infrastructures can be missing. Both informatics systems and large delivery infrastructures are needed for the establishment of commodity exchanges. They can be lacking in some developing countries.

Market structure hypothesis: Apart from the geographic unipolarity discussed in the previous hypothesis, other market structure aspects may answer the research question. It cannot be excluded that the fragmentation of the market into an infinite number of small market actors rather than institutionally well-established participants can limit the participation in futures markets (Roche, 1992; Latham, 1998). As Carter mentioned, many of the few large entities involved in rice trade are co-operatives. These can, under certain circumstances, have marketising models removing free market risk, leaving them with no reason to trade derivatives. Other large entities can have counter-incentives in participating as it may threaten their asymmetric market power. This is challenging the neo-liberal narrative that non-sophisticated actors are victims and simply leftovers of the financial system. It is generally assumed in the Western financial literature that producers at different levels of the supply chain are risk-averse and consequently willing to use derivative contracts (Hardaker, Huirne, & Anderson, 1997; Tomek & Paterson, Risk Management in Agricultureal Markets: A Review, 2001). However, I must review a hypothesis suggested by Hardie: "Less [sophisticated] actors can see [financial development] as contrary to their interests, and therefore act in ways that hinder that [financial development]" (Hardie, 2012, p. 5). This comes down to researching stakeholders that would deliberately act against the emergence of financial risk management in rice-growing countries. Finally, another type of integration is lacking: price integration across varieties, qualities and geographical areas. This makes hedging with a futures contract potentially inefficient.

Information hypothesis: Rice is characterised by a strong asymmetry of information. Information remains largely private and difficult to acquire; many quantitative data are simply unavailable, even to analysts. This means that the market is largely inefficient. The price of commodities depends not so much on actual demand and supply but rather on information regarding demand and supply (Tomek & Paterson, Risk Management in Agricultureal Markets: A Review, 2001). In theory, prices of commodity futures contracts are lower than spot prices and converge as the contract gets closer to maturity. This is due to the decreasing level of risk, which is caused by increasingly reliable information on prices as the maturity date gets closer and the decreasing time for non-forecast events to take place. However, in an opaque market, this relation can be broken, resulting in non-convergence at maturity and therefore hedging inefficiency. This is a disincentive for its use by physical market participants.

The other issue created by opacity is that some actors take advantage of their information asymmetry to set prices advantageous for their business. As futures markets make a price publicly available, they thus have an interest in keeping rice financially underdeveloped, recalling the previous hypothesis (Roche, 1992).

Politicization hypothesis: The last hypothesis is the role that politicization can play in impeding the process of financial development. It will be demonstrated through this thesis that the rice market is under unusual and intense political pressure and intervention, compared to other commodities. This is due to its role in food security and livelihood for large shares of populations in Asia (Gulati & Narayanan, 2003; Shigetomi, 2011; Clarete, Adriano, & Esteban, 2013). This politicization is a destabilising factor for international trade and prices. It is also a reason for the lack of price integration as each country has its own price program. As a result, speculators are usually wary of being involved in a market where the link between the physical and the derivative is frequently disrupted, and where the price formation can be challenging to forecast. Political intervention can also remove the need for private hedging when it takes the form of government insurance schemes or market price setting.

X) Methodology

As I hypothesised that the geography of the rice market, its lack of integration and preponderance in developing countries is key to its financial development, I needed to ground my analysis in a set of geographical cases. The cases-based method allows a qualitative researcher using “a small sample of purposively chosen cases of a given event or process” to explore the mechanisms of this process (Schrank, 2006, p. 22). In my research, this process is the financial underdevelopment of rice, and my cases must therefore be valuable cases containing the causal explanation to this underdevelopment. I thus used three main geographical cases: the USA, Vietnam and Thailand. I justify the selection later in this chapter.

Since the research question is derived from the observation of the fundamental anomaly of the rice market regarding financial development, the research inevitably must be articulated around a comparative method. The strategy of this research is to identify singularities within the rice market that cause this anomaly of market development when compared to other agricultural commodities that use derivatives. Any fundamental difference could be the factor hindering derivatives development for rice.

To complete the hypotheses formulated in this introduction, in Chapter II, I present the theory around the failure of futures contracts, which will allow me to identify prerequisites to financial development, as well as other challenges in the building of the derivative markets. The rest of the thesis attempts to identify whether such factors could explain the financial underdevelopment of rice. When the hypothesis is confirmed to be a matter for the rice market, I then use the comparative study to determine whether such factors are, indeed, obstacles to financial development. To do so, each factor must be compared with the comparison markets. If they are components of these markets, it would mean that these factors, by themselves, cannot prevent financial development. In such cases, I will need to determine if they are, at least, limiting factors. To complete the comparison, I will also search within my compared crops for elements that could have facilitated the development of derivatives trading and that might be missing in rice.

I mentioned earlier that this thesis also aims to contribute to the theoretical understanding of commodity derivatives markets' development. Although rice was selected because of an interest in the case rather than being strategically selected for theoretical critique, it is still a very valuable case study for theory construction. Depending on the theory explored, investigating rice serves different purposes. For instance, when examining whether financial development is a dominant and unavoidable force on food markets, the rice market serves as a deviant case analysis. It is the one market that does not fit into this narrative (Lijphart, 1971). On the other hand, when studying the theory around the cause of contract failure, rice serves as a theory-confirming or theory-invalidating case study. It serves as a test of propositions of how futures contracts fail (Lijphart, 1971).

a. Research Method

The main body of this qualitative research is based on the interviews of 46 market stakeholders during 41 interviews. These took place in the US, the UK, Japan and Singapore, as well as remotely. All the participants were involved or formerly involved in commodity markets, whether in the physical supply chain, in the finance industry or as research analysts. The interview process was carried out from July 2019 to November 2019. A list of interviewees is presented at the end of the thesis, while table 4 regroups the various profiles of my interviewees by activity and location. Interviews typically lasted one to two hours long.

I originally intended to carry out fieldwork in each of my geographical cases. However, after time spent in Louisiana – where I interviewed members of the US physical markets – and Chicago – where I interviewed stakeholders of the futures market, I could not obtain a research permit for Thailand or Vietnam. I attributed the refusal to award me a research visa to the political sensitivity of the crops studied. However, my case studies were strategically chosen and there was data to be collected in these markets. During my time in the US, I had to carry out phone interviews on multiple occasions. This was, for example, because some of my interviewees were in New York City or spread out in the Midwest, or because hurricane Harvey, which struck Louisiana in the summer of 2017, limited my mobility in the region for a week. I had thus familiarised myself to the process of phone or online interviews. This gave me confidence that such research could be carried to reach out to interviewees in Southeast Asia, although it limited me to discussions with only market participants fluent in English or French. As most of my target interlocutors were involved in the export market, this did not turn out to be a great obstacle. A handful of interviewees were not confident enough in their oral English proficiency and preferred to take part in a live written interview instead. The ability to interview remotely became particularly viable when it appeared that many market participants key to the process of financial development were spread out across the world. At the beginning of 2019, I held a research fellow position at Kyoto University, which allowed me to carry out strategic interviews in Japan. I also stopped in Singapore on the way back to Europe to carry out additional interview work.

	Farmers and farm managers	Processors (millers)	Traders, exporters and brokers	Analysts	Financial executives and others[15]
USA	5	4	5	2	5
Thailand			4		
Vietnam			4	1	
Japan					4
Rest of the World			6	2	4
Total	**5**	**4**	**19**	**5**	**13**

Table 4: Profile of the interviewee's sample

In order to successfully solve the puzzle of the research question, an important amount of contextualization of the market dynamics. This includes the study of the the lives, thoughts and profiles of market participants. This is precisely what interviews offered, the ability to collect a vast amount of data from a large number of people. As Hughes and Sharrock explain, it allows to go beyond what the researcher can immediately perceive and let interviewees "report on what they think about things, their past, give details of their occupation, home life, express their sentiments about the government

[15] Others include functions such as advisors, academics and well-informed stakeholders who preferred to not have their function revealed for anonymity purposes.

of the day … and so on" (Hughes & Sharrock, 2007, p. 94). These accounts serve to complement the existing set of data in easily accessible documents and the past academic literature, but most importantly formulating new hypothesis, based on unexpected narratives and puzzling experiences, and testing their validity (George & Bennett, 2005). In addition, as I will repeat throughout this thesis, the rice industry is a secretive one. Only the interview process could allow me to obtain the disclosure of often confidential information that would not exist in written documents or be found in the academic literature (I discuss anonymity later in this section). Other methods such as ethnography would not have allowed me to talk to enough participants and therefore gather the fragmented knowledge and sentiment of the commodity markets I study. The expression 'fragmented knowledge' is important: it appeared clearly that the questions I explore in this thesis were not unfamiliar to market participants and many answers had already been thought through. However, market participants often hold a share of the knowledge necessary to answer these questions and do not communicate. Under such conditions, the role of the researcher is to gather and reconcile the information knowledge of the industry. The information I aimed to collect can be broadly divided in two groups: historical accounts of past attempts at financially developing commodities, and narratives about market structures and actors' behaviour affecting the propensity of a commodity to develop financially.

Using interviews as historical evidence is particularly challenging. Documenting the failure of futures market is difficult as exchanges are often prompt to supress records of projects that did not have the expected outcomes. In addition, some of these projects were several decades old, before the digital age allowed for the use of the memory of the internet. Various documents can be available but without setting a clear narrative of the events as they happened. As a result, using the memories of interviewees is often a viable source of data. However, this method also has downfalls. As argued by Ritchie (2003), recollection can vary, either intentionally as interviewees can embellish or omit facts for the service of their own agenda, or intentionally as their memories become imprecise. In order to validate the memories of interviewees, I aimed when possible to corroborate these with those of other interviewees, as well as triangulating with document sources to identify any possible inconsistency in the narrative. When this was not possible, I had to rely on the interviewee recollection of events while also acknowledging it was their view.

Interviews were also the best solution to capture the narratives and practices around the financial development of a crop. The absence of derivative finance in rice has been in part built upon the industry's understanding of finance, as well as the perception of the rice market by the financial industry. Interviews therefore allowed letting participants use their own concepts and description of the matter that a survey would not have allowed for. In particular, semi-structured interview empower the researcher to discuss a range of topic while giving flexibility in the construction of the conversation, whether it is the order of question and the time dedicated to answer them (Robson, 2002). Using this method exposed me to the bias of my participants regarding the topic of research. However, these participants, individually and collectively, have responsibilities in the level of financial development of the market. This means that these precise bias impact their market behaviour and are important to comprehend in order to answer the research question. The main risk with this process is to generalise a bias from the experience of few interviewees. The awareness of this risk played through the whole research process, from the sampling of interviewees to the analysis of interview materials.

The semi-structured interviews also served a purpose in the comparative method used in this thesis. It was important to be able to ask similar questions to actors holding equivalent positions in different industries, or different geographical areas, while also adapting these questions to the interviewee's role. This allowed me to compare practices and market structure in each of these markets, and to see how they impact financial development. Of course, such comparison meets limitation within the practicalities of the research process. In my case, it was the comparability of actor's role onto the supply chain of their country and industry. For instance, I was limited in my ability to interview farmers in Southeast Asia while I had this access in the US. Ultimately, I argue that the role of US farmers and Southeast Asian exporters, although being different in the physical supply chain, was somehow similar in the process of financial development. However, I had to acknowledge in the conduct of my interviews that such comparison was not always consistent and part of the comparison work had to be done through the data analysis process rather than through data collection.

The profile of my interviewees can be divided into two groups: key stakeholders, who could contribute their expertise on a precise area of the research, or individuals who are representative of their interest groups. The set of key actors were interrogated with the aim of understanding specific events and market dynamics while generic actors were asked about their personal experiences and practices in order to represent their group. The key stakeholders were mostly individuals who had been involved in the creation of derivative contracts and could clarify the reasons for intending to establish them in the first place, as well as eventually try to diagnose their failures if relevant. They could also include other professionals that hold or have held preferential positions on the rice market, such as market makers in a specific contract. The key market actors can be assimilated to what the political science methodology literature calls “elites”, that is, those with close proximity to political power or with particular expertise (Slote Morris, 2009). The use of these interviewees that were not selected on a probability-sampling basis allowed to reconstruct the chronology of decision making that led to a set of events (Tansey, 2007). As I argue in Chapter II, individual human input has a role to play in the construction of financial markets; the testimony of these key market actors is therefore needed to understand the mechanisms of this process. The other advantage of key market actors is their ability to make inferences on larger groups of actors’ characteristics and decision. When, for instance, access to farmers was restricted, discussing with intermediaries who are familiar with their practices and preferences through their collaborations offered an alternative, although it expose the data to the bias of the key actor.

The second set of interviewees represented larger groups of market actors. I intended, whenever possible, to interview multiple individuals for each group to avoid any outlier effect. These interest groups included exporters, millers, analysts, traders or farmers. The access to farmers, once again was limited by the impossibility to do fieldwork in Southeast Asia. However, through the first phase of the research, it appeared that depending on the level of financial maturity of a market, farmers might not be the most important stakeholders to talk to. In the US they were important because the futures contract is in place there and farmers could therefore be involved in it. This was not the case in Southeast Asia, where potential market makers such as Thai exporters were more relevant to the research process. I justify in Chapter VI why farmers cannot generate the liquidity in futures contract, and how some exchanges believing so has caused the failure of some contracts.

Access to interviewees was originally made possible by my professional experience on the rice market, providing me with a variety of gatekeepers.[16] Afterwards, a snowball technique was used to identify interviewees. My two main other ways of identifying and contacting interviewees were the use of LinkedIn and the access to food industry conferences such as SIAL.[17] Finally, other techniques, such as the use of professional association directories or public records of farmers who had benefited from government subsidies, have been attempted but remained largely unsuccessful. I must once again state that the rice market is secretive and the ability to get respondents is often restricted. However, this contributes to avoiding a bias in interviewee selection by the researcher, as any individual willing to take part in the discussion would have been invited to do so. Nevertheless, the method for identifying interviewees does include its bias. For instance, the use of Linkedin and international conference pushes towards the interviewing of globalised professionals communities. This bias has a restricted effect on the results: I argue in this thesis, with the case of Thai rice exporters, that these business communities would be the most likely to use futures when the market structure becomes sophisticated. As it appears that their propensity to do so is limited, interviewing these individuals to understand why was a priority.

The sampling of interviewees faces the risk of bias coming not only from the researcher, but also from interviewees, what Costigan and Cox (2001) call self-selection bias. This is the process by which a category of individuals sharing common features is less likely to be willing to participate than others. I was expecting that this bias could be significant in my research, as those who are not willing to see financial development in rice could have be reluctant to participate. In practice, this phenomenon has been minimal. It arises in the case of American co-operatives that I discuss in Chapter III. For the rest, participation has been balanced between those who believe derivative finance is needed in the rice market and those who do not think it is necessary. The snowball technique also create a risk of bias as interviewees can encourage peers they share opinions and practices with to become participants. However, once again, they have often done the opposite and directed me towards

[16] I worked as an analyst for the LiveRiceIndex in 2016-2017.
[17] Salon International de l'Alimentation

other industry actors that did not share their belief. Therefore, I am confident that my sample of participants was representative of the various groups of the industry.

After seeking interviewees' approval, all but one interview was recorded. One interviewee declined to be recorded, pretexting the noisy environment where the interview took place. Approaches to anonymity was less consistent between my interviewees. Ideally, I wished to be able to name my interviewees. It allowed me to refer to them consistently through the thesis, and expose their legitimacy on some topics However, many preferred to remain anonymous. They did so for two main reasons: either they were concerned about governmental disapproval of their participation in my research, or did not wish to seek the approval of their employer to talk to me, nor engage their company in the expression of their personal opinion. In practice, the anonymisation of many interviewees has been challenging. For the group of interviewees representing groups of market actors, identifying them by their profession caused no issue. However, for key market actors, their position or the information they shared could have betrayed their identity. Some unique characteristics of these interviewees made them eligible for the study in the first place but also made the reference to these characteristics conflict directly with their need for anonymity (Morse, 1998). This is why, in this thesis, the source of some information has to be referenced only vaguely with no more details than that such information came from an interviewee. In order to protect further the identity of anonymous interviewees, no precise dates are given in the list of interviewees.

Looking at my list of interviewees, it looks as all my interviewees were men. Although there was an imbalance in the genders of my interviewees (which represent an equivalent imbalance in the industry), all of the women I interviewed but one required anonymisation. I believe that was not due to their gender but rather their positions in the industry, as their male counterparts with equivalent positions often required anonymity too.

As mentioned earlier in this section. in addition to the interviews that will feed my qualitative analysis, I often added document analysis and short quantitative analysis for triangulation purposes. Apart from public organisations' archives and statistics, newspapers are also a way to cover past events that were valuable for my research.

b. Case Studies

I selected three case studies – the USA, Thailand and Vietnam – to conduct my research. These were expected to constitute together an optimal representation of the diversity of the global rice market. However, during the research process, the case of Japan appeared also to offer valuable lessons about politicization. I thus worked on three major case studies and a minor one. The main difference was that the data collection for the major case studies was made broad to obtain a maximum number of objects of analysis, while the research on Japan was very targeted to understand a precise issue.

The USA was the first case study. Despite being the most financially developed economy in the world, many attempts to establish futures contracts for rice have failed there. Chicago currently hosts a rough rice contract, but this one is only thinly traded (CME Group (c), 2017). It thus provides for an interesting case study for multiple reasons. Firstly, as the US is a financially developed economy, it allows for isolating the analysis from the development hypothesis to eventually identify issues that are specifically linked to the nature of the crop. Secondly, the CBOT rough rice contract has the peculiarity of being a well-established contract while maintaining low liquidity. To the standards of American futures contracts, it appears as a failure, but to the standards of the rice market, it is successful. Understanding the achievements and shortfalls of this contract is thus important. Thirdly, the rough rice contract provides a rare opportunity to analyse rice actors' behaviour towards an ongoing contract. The rest of the analysis is based on research covering past and partially forgotten contracts, or the speculative attempt at a contract. Finally, in the last chapter of this thesis, we study the possibility of a world contract, and the most liquid existing contract is potentially key for it. This is why this one needs to be explored in detail early in the thesis.

Thailand – consistently the largest or second-largest global rice exporter – is the second case study. During the late 20th century and early 21st century, Thailand was known as the “paradise of liberalised rice trade”, which was one reason why the London FOX made its rice attempt with Thai rice. After its failure, the next futures contract for rice would be established domestically in 2007 before defaulting in 2011 (McKenzie A. , 2012). Surprisingly, this period coincides with the politicization of the Thai market as a result of the Shinawatra family’s involvement in market manipulation

(Biswas, Kastner, & Tortajada, 2015; Hookway, 2016). The politicization of the national market is one of the main reasons for using Thailand as a case study. The market not only presents signs of government involvement but also frequent shifts in these rice policies. As the constitution of Thailand expects free democratic elections, rice policies become an electoral determinant that increases political risk. As Thailand is one of the key actors on the global market, rice's politicization does not only matter domestically but to the entire rice market to which it provides political risk. The Thai case is consequently very valuable as it allows for the examination of how linked the dynamics of politicization and financial development are.

The case of Thailand is valuable to examine for two other reasons. Firstly, Thai 5% broken long-grain white rice is often used as a world benchmark. An international contract for rice would therefore most likely be based on this rice grade and other origins are expected to be possibly hedged against this grain (I will discuss this supposition in Chapter VII). Thailand would therefore be at the core of the development of derivatives trading. The second reason is that due to their market power and sophistication, Thai rice exporters are often understood as the most sophisticated actors of the Asian rice market. It is thus believed that they would have a key role to play in the successful development of derivative trading in the region.

Vietnam is the other Southeast Asian case study used in my research. The reason behind this choice is that Vietnam differs from Thailand in many ways and therefore allows for focusing on other aspects of the financial underdevelopment. Unlike Thailand, Vietnam does not hold democratic multi-party governmental elections. Consequently, rice policies are designed for the long term, avoiding frequent shifts affecting the market. This gives the possibility to keep the variable of politicization stable and focus on other hypotheses such as the market structure or issues related to developing countries. This last point is even more relevant as, while Thailand is already an emerging Tiger economy, Vietnam remains a frontier economy. However, Vietnam is a major exporter of a variety of commodities and agricultural goods, including rubber and coffee, for which derivative trade is used. This shows that the financial development of commodity markets is possible in a developing country. I will examine how such financial development happens and draw conclusions for the rice market.

c. Comparative case studies:

As I mentioned earlier, I have selected three crops – wheat, sugar and coffee – to compare to rice in order to identify systemic differences. Although I have used them comparatively at various stages of the analysis when they are individually relevant in relation to rice market's features, each has been originally picked for a specific purpose.

Firstly, it should be noted that each crop has a specific, respective importance in each geographical case study: the US is the second biggest global exporter of wheat, Thailand is one of the leading powers in the sugar trade, holding the second amongst the world's top exporters, and Vietnam is the 2nd largest world exporter of coffee and is 1st for the robusta variety (Bain, 2013).

Wheat is compared to rice primarily because it is one of the most financially developed agricultural commodities, with a long history of contract trading. Derivatives are traded both at the domestic and global level. It provides one of the most complete pictures of how the financial development of a grain industry can look. This case will be particularly useful in the case of the US and will allow for the understanding of the interaction between the futures market and OTC markets. Wheat also has the advantage that it shares many features with rice: it is a global commodity, it is a staple in some developing countries, and it is sometimes used as a substitute to rice for human consumption in some regions (especially in sub-Saharan Africa) and for livestock. Like rice, wheat is mostly a food and feed crop, unlike corn, for instance, which is now largely used for ethanol and has therefore turned into a hybrid food/energy market. These similarities are important because it enables the isolation of other factors of divergence that could impact the development of derivative markets.

The principal interest for comparison between sugar, a financially developed crop, and Thai rice, is their different structure of politicization. The sugar market is also politicized in most countries, including Thailand. The study of sugar will therefore serve the understanding of why a crop's politicization impedes the development of its derivatives market or not.

Finally, coffee is compared to rice, especially within the context of Vietnam. Like rice, coffee is a non-homogenous commodity mostly produced in the Global South. However, unlike rice, it displays a high level of financial development through the supply chain, through the use of international futures contracts and localised OTC contracts. This commodity is therefore particularly useful for the examination of the developing countries hypothesis. Furthermore, the case of Vietnam is interesting because local exchanges were attempted for coffee there. One of the questions about the financial development of rice being its geographical organization, exploring the functioning of futures contracts at the local level is particularly valuable.

XI) Structure:

I finish this introduction by presenting the structure of this thesis and the argument that will be carried through each chapter.

Chapter II: Fragility of Futures Contracts

This chapter aims to explain why futures contracts, fundamental elements of the sophistication of the market structure, tend to fail over time. I look at the literature about contract success and failures and show that it thoroughly discusses the economic rationales of the physical market prerequisites for a contract to have a chance to succeed. Although this is extremely important, I also argue that there is another crucial set of parameters involved in the success or failure of a contract: the circumstances of the birth and life of the contract. These include whether the engineering of the contract specs is right, how to create initial liquidity, exposure to manipulation, obsolescence of contracts, etc. These issues are less consistently discussed in the literature. This chapter argues that contract failure is the norm as there are so many reasons for a contract to not function and that the sophistication of the market structure in the long term through the availability of a derivative contract should be considered the exception.

Chapter III: Explaining the Low Liquidity of the CBOT Rice Contract

Chapter III examines the American rice market and its futures contract for rice. While it is the only truly functional contract for rice worldwide, it suffers from low liquidity. I propose a variety of factors that individually deplete the liquidity and together limit the financial development of the market. Some cover the hedging effectiveness of the contract, with problems of contract design and convergence between the cash and futures prices, while others involve an issue of the sophistication of the market actor.

By comparing the Southern rice market to the wheat market in the Midwest, I show an issue of maturity in the structure of the American rice market – there is a lack of intermediaries having the financial literacy to deal with derivative trading. In addition, farmers' behaviour towards price risk is affected by their greater aversion towards production risk due to the climatic instability in the rice-producing state, making them unwilling to hedge price risk. Finally, I show that the ongoing farm program limits the need for hedging by producers.

Chapter IV: The Political Burden of the Rice Market?

The question of the impact of governments on commodity markets is examined in this chapter. The central argument of this chapter is that politicization, defined as the potential for governmental interventions motivated by final goals exogenous to the market, tends to impede the development of derivatives markets. Politicization has two main effects on commodity markets: they can suppress price volatility leaving no risk to be traded; or create significant political uncertainty in price formation which discourage speculators from taking part in the futures market. I show that the rice market, due to its political salience, is particularly exposed to the issue of politicization. I argue that this is the case in all rice economies, but use extensively the case of Thailand, as an example. I then present the state of politicisation on my compared market and find that coffee is a largely depoliticised market; wheat is politicised, but the components of politicisation are sufficiently simple for market participants to understand and model it in their price risk models; while sugar is closer to rice in term of complex politicisation globally. This means that while politicization can be a factor impeding the development of derivatives markets, it cannot be the single reason for the financial underdevelopment of rice.

Chapter V: Politicization of Futures Contracts and Exchanges

In this chapter, I show that governments do not necessarily intervene in the physical market but can also directly voluntarily suppress financial development by disrupting the functioning of futures contract and/or exchanges. This is both common for agricultural markets in developing countries, and rice futures markets in all its major producing countries. After reviewing issues faced by agricultural futures markets in developing countries, I use the cases of Japan before WWII and in the 21st century. This chapter demonstrates that the financial development of a crop in a developing country, or a country where it is politically very salient such as rice in Japan, is unlikely to take place at the local level. I argue that futures market can be instrumentalised by governments or interest groups that are clients of political parties. I show that a government can intentionally disrupt financial development, but does not have significant impact when it attempts to encourage it.

Chapter VI: Financial Development of Agricultural Commodities in Developing Countries

This chapter seeks to show that several further issues characteristic of developing countries limit the development of derivatives. The case of Thai rice will illustrate how sophisticated market actors enjoy additional market power from the lack of futures and are therefore interested in the persistence of the status quo. An issue with the lack of market information also appears to limit the potential for the establishment of functioning futures contracts. This chapter also argues that the lack of robust contract law and derivative market regulation mechanisms prevent the good functioning of both OTC markets and, indirectly, Futures markets. However, I reject this argument as being a primary cause of financial underdevelopment of the rice market. Additional logistical issues that are characteristic of developing countries are also discussed. The case of local futures contracts for coffee in Vietnam will illustrate the difficulties in enhancing the sophistication of the market structure in developing countries. This chapter will finally demonstrate that understanding the financial development of soft commodities – sugar in particular – as a success in developing countries, is an illusion. Despite large shares of the supply chain being found in developing countries, the large scale of sugar farming is not characteristic of usual farming activities in those countries. In addition, most of the commercial liquidity of futures contracts for sugar comes from international trade. There is no reason to believe that sugar can be a model for rice – a market based upon small scale farming and small trading entities.

Chapter VII: The Making of a Global Contract

The previous chapters demonstrated the difficulties in establishing local contracts in developing countries, and observed that the financial development of coffee, sugar and wheat is based upon the creation of global contracts. This chapter evaluates the challenges in creating such a contract. It explains the need for, but also the complexity of establishing a global benchmark for rice because the market is fragmented both geographically and in term of grades and varieties. I discuss the previous attempts at creating such a global contract for rice and the ongoing discussion about whether this can be done. I finish by discussing the emergent alternative currently gaining support in Europe: the use of swaps contract for Asian rice.

Chapter VIII: Conclusion

In this thesis, I demonstrate that historical attempts at establishing futures contracts for rice have failed mostly as a result of circumstantial problems, such as the solidity of the hosting exchanges or contract design mistakes. They do not ultimately demonstrate the impossibility to sophisticate the market structure in rice. However, the struggle of developing rice financially in the US suggest that the organisation of rice production and trading does not fit the prerequisite for futures contracts success. Therefore, there is a need to look at the various hypotheses to explain derivatives markets underdevelopment, including the politicization, various organisational problems found in developing countries, or the fragmentation of the market. These issues are also observed in other agricultural markets but none of those markets accumulates all these factors together. However, we may see in a near future the emergence of new derivative products able to solve the issue of the sophistication of the market structure, while requiring less sophisticated market participants.

Chapter II: Theory of Contract Failure, The Fragile Nature of Futures

"I wonder why no one is offering a futures contract for rice". During an interview in a noisy café in Singapore, a grain trader[18] echoed the incredulity expressed a few months earlier by a rice exporter from the Thai company Tanasan[19]: *"I am surprised there is no derivatives market like for sugar. Rice is not there yet".* These two men were aware that some attempts had been made but acted like those did not matter. From their point of view, indeed, the result was the same. There is no solution to financially hedge price risk faced by rice market stakeholders. However, for the scope of this thesis, it is fundamental to acknowledge these attempts, even if they did not result in the long-term sophistication of the market structure. Rice is like most major commodity markets for which complete underdevelopment of derivatives over time is rare. There are often been projects of establishing futures contracts, designed and offered by commodity exchanges. Until the 1990s, most of those exchanges were mutualised association of traders that operated not for profit but in the interest of their members by making a hedging tool available. Since then, most exchanges[20] have become demutualised and privatised, now operating for profit. Exchanges make money by taking a small commission on every contract traded (Roche, 2017). Regardless of the motivation behind contract innovation, this has resulted in the launch of various contracts for rice, with only few successes and many failures. When investigating the absence of futures contracts for rice, the question should thus not only be why they are not offered, but also why, when they are or have been, they were hardly consumed. A part of the answer is that establishing futures contracts that are well functioning, for any commodity, is difficult.

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[18] Interview with an anonymous international wheat trader, Singapore, April 2019.
[19] Interview with an anonymous employee of the Thai rice exporting company Tanasan, Thailand, July 2018.
[20] From all the currently operating exchanges I mention in this thesis, only the Osaka Dojima Exchange still operates as an association of traders.

In this chapter, I explain why commodity futures contracts tend to fail. It will allow the building of a theoretical framework to support the research in subsequent chapters. I argue that the failure of contracts can happen at four stages: (i) failure of the cash market to provide the prerequisite characteristics for the use of futures contract, (ii) mistakes in the engineering of the contract, (iii) failure to attract liquidity, (iv) the occurrence of one of the first three points in the long run, even after the successful launch of a contract. This categorisation is useful because while the first category implies, if validated as the reason for failure, the impossibility to make the market structure sophisticated, the second category allows for discarding the failure of one specific contract as a sign of fundamental obstacles to the development of derivatives trading. The third category appears to be context-specific and leads to different conclusions.

I) Theory of success vs theory of failure.

As this chapter attempts to theorise contract failure, it should first be explained why it does not theorise about contract success. In the key chapter of her PhD thesis that has since become a reference, Deborah Black (1985) chooses to establish a theory of contract success. Theory of contract success and theory of contract failure are clearly linked. It seems like a semantic detail as the use of affirmative or negative sentences often allows for a shifting between those theories. However, the choice between these theories carries implications of the researcher's inclinations. Studying contract success could imply an objective to achieve this success. Theorising contract failure better supports a study attempting to explain where things go wrong. This suits the purpose of this thesis since the successive attempts at developing derivatives for rice were unsuccessful. However, the prevailing reason to examine failure is that well-functioning futures are not the norm. Sources diverge regarding the futures' rate of failure in their early years, mostly as a result of chosen metrics. Carlton (1984) found that 46% of US futures contracts created between 1921 and 1983 did not last longer than five years and that the average lifespan of those contracts was nine years. Silber (1981), depending on the measure used, found that a third to a quarter of futures contracts fail to attract significant trading volume. In any case, these studies show the challenge of establishing liquid futures markets. Contracts have a propensity to fail because of the multiplicity of reasons that can cause failure. The success of a contract could thus be understood as the probability that none of these failing factors will arise. This chapter shows that although there are several prerequisites to success, failure is still possible after validation of those prerequisites. Instead, the entire list of factors potentially leading to contract failure is not known. From this observation, it is easier to anticipate that a contract will fail because of one of the known factors than succeed as a result of avoiding all failing factors, many of which are not known.

II) Defining contract failure.

Before reviewing the reasons for failures, it is important to define what is understood as failure (and success). The literature uses a variety of measures to determine whether a contract fails or not. This time, it does not matter whether we talk about success or failure as the two concepts are mutually exclusive. A popular method measures the number of contracts traded in a year. A minimum threshold that divides success from failure can be used, but its relevance is ultimately subjective, as noted in Sandor:

> If a successful contract is defined as one with an annual volume of 1,000 or more contracts, then eighteen *[out of his sample]* would be termed successful. It is important to emphasize that 1,000 contracts is an arbitrary number and a volume which is exceedingly low. It has been used because an exchange would probably not delist a commodity with that (Sandor, 1973, pp. 120-121).

While Sandor was already cautious about this number, it has been subsequently criticised as too low. For example, Black (1985) noted that it represented an average of approximately five contracts traded daily. Silber (1981) also used the concept of minimum contract traded to avoid the contract being unlisted[21] by the exchange but chose 10,000 contracts traded in a year. However, in his model, this minimum level must be reached after the third year of the contract's existence. He also used another measure of success: examining whether a contract is still traded at the end of his sample period.

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[21] I explain the logic behind delisting below

Another measure that could be considered, if success is taken from the point of view of the exchange, would simply be whether a contract is profitable. The investment by exchanges in contract development is rarely known, but it is for instance estimated that the average cost of contract innovation (including contract creation and contract modification) was on average $40,000 in the 1970s in the US (Silber, 1981). There are no publicly available estimations of the current cost of developing a futures contract, although certain participants suggest the sum of $1M. Any volume of trading that would allow a return over the innovation costs could be understood as a success by the exchange if this one is for profit. The issue of this logic – in the context of my research – is that a contract could first succeed for the exchange and later be unlisted, leading to a de-sophistication of the market structure. With this approach, success is definitive even if market actors that are willing to use futures contract are subsequently deprived of hedging solutions.

Carlton (1984) and Black (1985) used the survival of a contract as an indicator for the success (or not) of a futures contract. However, this measure was based on the listing by the Wall Street Journal rather than by the exchange. The policy of the Wall Street Journal is to list a contract if it reaches the levels of daily open interest of 5,000 contracts and trading volume is greater than 1,000 contracts per day.

In recent years, as it is easy to access the contracts listed by exchanges on their websites, the use of the Wall Street Journal has become somewhat obsolete. The will of an exchange to keep a contract listed is the first indicator of its success, or at least of its non-definitive failure. Only the delisting of a contract would signify its definitive failure. It is necessary to clarify why a contract would be delisted. Once a contract has been developed, there is no additional financial cost for an exchange to keep listing it. However, it is understood that there is a reputational cost for an exchange to list many illiquid contracts. The market appears unsuccessful and thus unreliable in the eye of potential new market participants. For this reason, it is also difficult to collect data about defunct contracts as their exchanges do not leave much information available about their past existence.

In the case of this research, a successful futures contract should be defined as a contract that makes risk trading possible. The listing of a contract for the commodity is thus the first condition. However, an exchange could keep a non-traded contract listed, expecting that the trading environment will change. In addition, a contract could exist but be unsuitable for hedging. Hedging effectiveness is consequently the second condition for a contract to contribute to the sophistication of the market structure. Hedging effectiveness has been understood as a factor of success in certain research (Gray, 1966; Tashjian Johnston & McConnell, 1989), but it is also used here as a measure of success. However, as this is not an econometrics study, the convergence of spot and futures prices (representing the hedging effectiveness) will not be numerically measured.[22] Nevertheless, it is important to remember that usually, in the case of deliverable contracts, convergence attracts liquidity and liquidity contributes to convergence. Therefore, using the open interest and traded volumes as measures of liquidity is an indication of the success of the contract. It is important to combine the two because they do not individually guarantee hedging effectiveness. Large open interest with little traded volumes is very unlikely. Trading volumes alone are irrelevant from our point of view because large trading volumes combined with small open interest can be generated by over-speculation, and the futures price may end up far away from the physical market, limiting hedging effectiveness. In addition, liquidity is a third condition in and of itself as market participants unable to take part in delivery need the guarantee that they will find a counterpart when they wish to close their position. I will not use a minimum number of open interest and volume to differentiate success and failure. These numbers are relative to the size of the contract and the size of the physical market. Instead, I will mostly rely on market sentiment on whether the contract is liquid enough, and the hedging performance robust. Market participants interviewed over the course of this research have often mentioned issues of liquidity. This research attempts to determine whether their views are shared by most stakeholders, are specific to an interest group or are only an individual perception.

III) Prerequisite structural factors to the use of futures contracts

Not every commodity market suits the use of futures contracts. Certain conditions must be respected for a futures to have any chance to function correctly. The literature has

[22] When studies have been conducted for certain contracts, I will use them. However, these studies are often lacking and it is necessary to propose an alternative theoretical method.

listed those conditions, certain of them attracting consensus, making them sine qua non parameters, while others are either disputed or sporadically mentioned. In this section, I review the physical market's characteristics that, if missing, lead to the failure of a contract.

- <u>Volatility to attract hedgers and speculators</u>: This is the most fundamental criteria necessary for the success of a futures contract. It is the object of a consensus from academics and market observers who have tried to list the prerequisites for contract success. It is named in a variety of ways in the literature, such as fluctuating prices (Black, 1985), uncertainty (Carlton, 1984) and cash price variability (Sandor, 1973; Brorsen & Fofana, 2001). The reason why fluctuating prices are necessary to the success of a futures contract is that it represents price risk necessary to attract both hedgers and speculators. Volatility is the *raison-d'être* of futures markets. It creates a commercial need for hedging, as the greater the price risk, the more incentive physical market participants have to lock in prices (Black, 1985; Till, 2014). However, it is important to note that the propensity of commercials[23] to hedge is also a function of their risk aversion, which can be particular to their market (Schneidau, 1970). Sufficient volatility also means that speculators, who seek risk by nature, have a higher potential for profit and are therefore more likely to participate in the contract (Black, 1985). Therefore, variability in prices is the parameter that brings together the two distinct groups of market participants. It is fundamental to the success of the contract that both sets of actors get involved in the market (Gray, 1966; Silber, 1981; Black, 1985; Till, 2014). Gray explains that the need for hedging is chronologically the first prerequisite for futures to function. Commercials' reasons to use the futures may be "financing of inventories, forward pricing, or obtaining shopping convenience" (Gray, 1966, p. 122). By using the contract, hedgers ensure the linkage with the cash market, keeping price behaviour coherent (Silber, 1981). Then the market needs to attract speculation, "chiefly to offset the tendency for short hedging to exceed long hedging" (Gray, 1966, p. 122); and because "without speculative

[23] The term commercials refers to futures markets' participants that are also active in the physical market. They are the hedgers in the derivatives market, while the non-commercials are the speculators.

capital, the risk reduction sought by hedgers will be too expensive" (Silber, 1981, p. 129).

- Price freely determined: The need for cash prices being competitively determined also attracted a broad consensus (Schneidau, 1970; Silber, 1981; Carlton, 1984; Black, 1985). For the market to be fair, the supply or the demand must not be in the hands of cartels or a monopolist/monopsonist, otherwise, it opens the door to manipulation. Manipulation pushes participants away, especially speculators who are completely free to participate or not in a market (hedgers could still be better off using a manipulatable futures market than having no hedging instrument) (Silber, 1981). The monopolistic or monopsonistic behaviour, as well as other types of manipulations of the cash price, may be the action of a government. It is largely assumed that most public policies for commodity trade and prices have a negative impact on the success of futures contracts (Gray, 1966; Black, 1985; Till, 2014). The issue of government involvement will be the topic of Chapter V.

- Size of the cash market: The bigger the size of the cash market, the more likely the futures is to succeed. Several reasons link cash market size and contract success. First, the large volume of a physically traded commodity reduces the probability that a single actor can dominate or manipulate the market (Black, 1985). Second, the larger the cash market, the more people are likely to be involved in that market and therefore be potential commercial users of the futures (Carlton, 1984; Black, 1985; Brorsen & Fofana, 2001). Third, a larger cash market involves what Carlton calls a larger value of transaction – the total financial value of the traded product – resulting in more positions to hedge and more incentives to speculate (Carlton, 1984). Fourth, if the market is broad, it is likely to be characterised by more continuous activity and frequent transactions that facilitate the balance of demand and supply and the flow of delivery that serves the arbitrage between cash and futures prices (Sandor, 1973; Black, 1985; Brorsen & Fofana, 2001).

- Supply chain organisation: Called industrial structure by Carlton (1984) and market structure/marketing channel by Brorsen and Fofana (2001), this point suggests that vertical integration is an obstacle to participation in futures contracts. Indeed, the more actors at all levels of the supply chain willing to use futures, the more transactions will occur. For instance, if a farmer sells to a miller, who after processing sells to an exporter, those two transactions can be hedged on a futures market. However, if the exporter owns a mill and procures the grain from a farmer, the second transaction is internalised and does not need to be hedged. Calton (1984) also mentions that the systematic use of long-term forward contracting between two actors performs as vertical integration as it removes the need for price prediction and hedging.

- Homogeneity: This describes the degree of variety and quality differentiation within one market. For example, sugar is understood to be a rather homogenous and undifferentiated commodity, while tea is a very heterogeneous good with a variety of unrelated prices. The extent of the need for homogeneity to succeed triggers discussions and varieties of approaches in the literature. Certain authors such as Sandor (1973) or Brorsen and Fofana (2001) believe that homogeneity (or the close movement in prices of different grades) should be understood as a prerequisite for the success of the futures. Carton (1984) believes instead that the contract can cover slightly different products if there is price correlation across those. Black (1985) and Schneidau (1970) focus instead on the need for a solid grading system and the ability to standardise the commodity. Finally, Gray thinks that homogeneity is overemphasised. He thinks that the prices of different grades do not have to move closely. He states instead that the futures can be of use for commercials active in grades that are not the one standardised "as long as there is a reliable and predictable relationship among the values of various grades" (Gray, 1966, p. 127). This applies to commodities for which different grades are inversely correlated (because of reversed harvesting seasons in the northern and southern hemispheres for instance). In this case, the importance is not that the spread between the prices of different grades is stable, but that they are deemed by market participants to be predictable.

- Storability: Finally, the ability to store the crop at a delivery point, eventually a warehouse, over a significant length of time, has long been thought to be a prerequisite for contract success (Schneidau, 1970). It was thought that the commodity needed to be in place ready for delivery to make arbitrage possible in the delivery month. This supposed that perishable commodities such as milk, meat or vegetables did not fit the criteria for futures contracts. Instead, Gray (1966) argued that what mattered was rather the availability of deliverable supplies. This notion is now somehow obsolete as the emergence of indexed contracts with cash settlement solved the issue of delivery when it is too complicated to set up.[24]

One more point has been formulated by a single author but is significant. Silber (1981) stated that basis risk should not be excessive[25]. This means that a lack of geographical integration of the market could result in basis risk being equal or greater to price risk, making hedging unfavourable.

The prerequisites listed in this section serve once again as a preliminary evaluation of the likelihood of a contract functioning. However, these do not guarantee avoiding failure. The subsequent chapters of this thesis will explore two problems: whether this theory is confirmed by financially developed markets (wheat, coffee and sugar) presenting those patterns, and whether the rice market does too. If not, it will cast doubt on the possibility to develop futures for rice. If so, it will imply that the failure of developing derivatives trading is due to other factors. The rest of this chapter explores what these factors can be.

IV) Contract engineering issues

In the previous section, we saw that the literature on contract failure and success extensively analyses whether the individual commodity markets fit the use of futures contracts for both hedgers and speculators. This comes down to examining market structure and price behaviour and concluding from it whether a contract could be successful or not. This can be understood as a matter of economic rationality. However, there is a part of contract success and failure, less systematically studied in the literature that,[26] I argue, should be understood as a matter of human inputs. All

[24] I discuss index-based futures contracts in Chapter VII.
[25] As basis fluctuates over time, basis risk describes the adverse effects of uncertainty in basis.
[26] Not all authors have gone beyond the economic rationality, sometimes because it did not fit the purpose of their research, such as Brorsen and Fofana (2001). Some, such as Roche (2016) and Gray (1966) have included contract design as a factor for success and failure. However, it is Black (1985)

early contracts failures are not the result of the underlying commodity's cash market being unsuited for futures trading (Black, 1985). As a matter of fact, contract engineers rarely venture to create a contract upon a commodity that does fulfil the prerequisites for success. In reality, it is the engineering of the contract itself that goes wrong most of the time. If one of the many contract specifications that must be decided upon is wrong, it can cause a contract failure. The role of the contract designers (often called product managers on exchanges) therefore becomes crucial in the engineering of a robust contract. Individual contract engineering can seem irrelevant to the issue of the derivatives development of an entire commodity market. However, there is a possibility that a commodity's derivatives have failed to develop, not as a result of the cash market structure, but as a result of mistakes made in the engineering of all its successive contracts. Therefore, this section attempts to identify what these engineering mistakes can be.

The first thing contract designers must consider is who the contract is designed for. The contract specifications determine who is the most likely to use the contract. For instance, the choice of the product itself, for commodities that are transformed along the supply chain, can be important. If retailers are the most likely to use a certain contract, then an already transformed product is likely to be more appropriate than a raw product. Instead, if the exchange thinks that the commercial participation will come from farmers, then the raw form of the commodity will be picked. It is not difficult for contract designers to adapt the product to the target users (Silber, 1981). However, choosing the target users in the first place can be more challenging. It requires identifying the interest groups that are made up of enough sophisticated individuals to use the contract. In case the sophistication of market actors is limited because of financial education, certain exchanges will provide training to solve this issue. A failure to do so can result in the failure of the contract.

The parameters that contract designers must decide upon are numerous. However, one is potentially the most important. I discuss in chapter VII the decision between basing the contract upon an index and using exclusively financial settlement, and making the delivery of the physical good on the exchange possible, giving market

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that has categorised what she calls "commodity characteristics" and "contract characteristics" as two well separated matters.

participants a choice between cash and physical settlement. For now, I will focus on the second option, as it has been more common for commodity derivatives in the 20th century, and my compared commodities are all dominated by deliverable contracts. If physical delivery is adopted then, defining the terms of the delivery becomes crucial. The delivery system must be functional to incentivise a part of the market to take part in it, generating the convergence between the cash and futures prices. The parameters to be decided include the location of the delivery point, the size of the delivery lot, the delivery instrument to be used, etc. If one of those parameters are not adapted to the needs of market participants, there will be a lack of delivery made and the cash and futures will not move in sync. Such issues have, for instance, explained the first failures of futures contracts for rice in the post-WWII era. In NYME in 1964, and in New Orleans in 1980, two contracts for milled rice were listed but failed soon after their introduction. Milo Hamilton,[27] the former head trader for Uncle Bens, explained to me that the major flaw in both contracts was to do with the form under which the grain was delivered. The exchanges chose to have delivery in rice bags with the marking of the USDA while traders needed bags with their own label. Milo recalled a conversation with a major trader at the time:

> *"he called up the millers and said 'look I like the idea of a milled futures but I want you to put my bag marking, not USDA's', and they were so naïve they said 'no the contract says USDA #2 rice I'm going to stick that label on'… He told me it was untradeable for that reason. Now when they started up in New Orleans, they did the same stupid thing".*

This is an illustration of a detail in the contract engineering leading to the contract failure. Without traders taking delivery, it was not possible to obtain convergence of cash and futures, and the contract was therefore useless as a hedging instrument. Such failure thus did not say anything about the feasibility of the project and the prerequisites of the cash market. Traders seemed enthusiastic about having a futures contract, but the unfavourable terms of the contract made them stay away from the derivatives market. Different contract specifications may have generated liquidity.

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[27] Interview with Milo Hamilton, *Former Head of Trading at Uncle Bens (Mars), President at Firstgrain,* Austin, Texas, USA, August 2017.

However, even with appropriate specifications, the exchanges may also have encountered systemic market issues further down the line.

The whole process of contract engineering lies in making a contract that is not too disadvantageous for anyone (Gray, 1966; Silber, 1981; Black, 1985). It implies consulting the parties involved in the industry and finding a compromise that will be viable for a sufficient number of participants. In the case of the rice bags issue, it could have been fixed without harming other parties, but often interests in contract specifications collide. Fred Seamon, contract manager at CME, said *"you want a futures to be fair to both buyer and seller sides, you don't want either one of them to have an advantage or you don't have a market. So, I joke about this, but our job is to make a lot or all of customers a little unhappy with the contract terms".* Creating a contract that puts the long or the short in a better position would consequently discourage stakeholders from taking the opposite position. There would be no trade as a result and the futures would fail.

I explained how major contract flows, especially when it comes to delivery, cause failure. However, even smaller issues can lead to this result. The list of details potentially affecting the functioning of the contract is so long that it is potentially unknown by contract makers. In Lamon Rutten's[28] words: *"there are small things that if you get them wrong, it can kill the contract*". He chose to illustrate his point with the case of crude oil. Currently, the largest commodity futures contract globally is the crude oil contract on NYMEX. This exchange is now part of the CME Group, but until 2008, the two exchanges were rivals. CME was the first one to introduce crude oil futures contracts in 1981, a year and a half before NYMEX. The two contracts were identical except for one difference. The floor brokers on CME were used to very small tick sizes[29] and therefore did not want a whole cent per barrel for a thousand barrels contract. In their view, $10 (1 cent times 1000 barrels) was too much; they preferred a 5$ tick. CME introduced a contract with a 0.5¢ per barrel tick value. The problem was that on the physical market for crude oil, no one prices in half cents. With that mistake, the contract stood no chance to attract commercial participation. About

[28] Interview with Lamon Rutten, CEO of the Indonesia Commodity & Derivative Exchange (ICDX), Jakarta, Indonesia, December 2019.
[29] See appendix A

eighteen months later, NYMEX introduced the same contract, altered with a whole cent tick; it was an immediate success. *"So small things can mess you up",* Rutten continued. *"You can have wrong delivery location or delivery grade, wrong logistics. You can treat two specific different grades as if they were the same, but the market says they are not. And they will not trust the way the market will move".* Therefore, the ability of the contract designer and their team to fully understand the needs of the physical market through research and consultation is a fundamental parameter that decides the success or failure of the contract. In the following chapters, I will, when possible, evaluate to what extent the failures of individual contracts for rice are the results of such mistakes or the signs of deeper structural obstacles to the sophistication of the market structure.

V) Generating initial liquidity and catch 22

Once a commodity fits the criteria for futures trading and the contract has been well-engineered, there is not yet insurance that the contract will take off. In this section, I examine the last obstacle to the sophistication of the market structure of a commodity through a futures contract: the attraction of liquidity. The first weeks of existence of the contract are often decisive in generating liquidity, but exchanges face a problem. There is a vicious cycle from the initial lack of liquidity. At age 0 of the contract, there is not yet participation; there is no guarantee for liquidity nor convergence. That is a counterincentive for hedgers and speculators to get involved. However, if they do not, the liquidity will never be generated and the contract will remain inefficient. Similarly, speculators prefer to be active on very liquid markets and by waiting for the market to be liquid, they deprive markets of liquidity. In the US, my interviewees frequently referred to this situation as the catch 22 of futures trading. Many market participants tell exchange managers that they would like to use the contract once it is liquid, but if all the potential contract users have this same reasoning, the contract cannot start. Julian Roche[30] – contract manager at London FOX in the 1990s – said, *"the big problem with launching any futures contract is that everyone stands at the edge of the*

[30] Interview with Julian Roch, Former Product Developer at London FOX, Western Australia, July 2017.

pool waiting for somebody to jump in. The creation of liquidity in the early stages of a contract is absolutely crucial". Similarly, Fred Seamon told me:

> *"Anyhow, with a new contract you usually have a broad base of support on both the buy side and sell side. They want the contract to work. But they don't want to be the first and they don't want to trade it until it has liquidity. … Cocoa for instance, we launched a contract. Almost all our market participants thought our cocoa contract was a better contract [than the existing ICE contract] but they would not trade it because it didn't have liquidity."*

That is why, before even launching the contract, contract managers usually concentrate substantial efforts in convincing a few major market actors to trade the contract from the start to persuade others to do the same. This operation, for which failure can mean contract death, has varying levels of success. I asked Fred Seamon:

> *SL: Do you have an explanation for that or is it just a matter of luck?*
>
> *FS: I wish we did understand that better because some contracts work, and some don't. Some take a long time though, just because they don't show promise right away doesn't mean it's a failure. It may be something that evolves. I think back to ethanol that we launched, it's still a small contract that has grown significantly, but it just started. I remember that we were happy that it traded almost every day even though it was just one or two contracts. I remember it jumped from 8 contracts a day to 12 and we brought in cookies to eat because we were in double digits! It grew from there, but it took a long time. You need commercial participants who are dedicated to it and don't mind trading small lots to begin with and then kind of grow with the product. But that's something the exchange doesn't have figured out after all these years[31]. Because most products still ultimately fail.*

The randomness of the successes at building liquidity makes many believe that when a futures market survives this stage, it has gone through an accident of development. In fact, the success of this operation is a mix of human input (the ability of contract makers to convince major actors to take part and the will of those to do so) and market

[31] CME was founded in 1898

structure (the existence of major sophisticated actors or their ability to participate). It should also be noted that it is not only the ability of participants to trade futures that matters, but also their will to do so. Gray (1966) argues that a factor affecting the success and failure of contracts is the disposition to use or boycott a futures market. This one lies in part in the existence of power advantage in the cash market. For instance, if a set of actors hold an information advantage within the existing market structure, they are likely to be reluctant to use a futures market that would create transparency. Therefore, any research on futures contracts should examine, for each case of a development attempt of a commodity, what the dynamics behind the build-up of liquidity were: who were the actors targeted by the exchange, whether they participate, why they chose to (or not), did the potential for liquidity exist in the first place, etc.

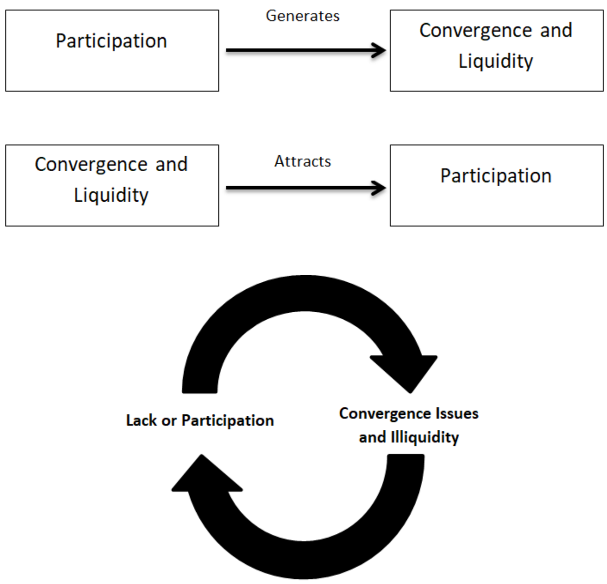

Figure 4: Catch 22 of liquidity and convergence

VI) Fragility of Existing Contracts

It is important to acknowledge that the sophistication of the market structure through futures is never definitive. The rice market illustrates that: although it is the commodity for which derivative contracts were first invented, it lacks futures markets nowadays. Taking a futures contract off the ground and successfully building liquidity, avoiding the common failure of contracts in their early age, does not give a long-term guarantee of survival. Julian Roche wanted me to be aware that the battle against the failure of a contract was never definitely won:

> *"Futures contracts, Sulian, are very, very fragile. Even if they trade large quantities and so forth on one day, they can not trade it the following week. They are fragile instruments and they need careful nurturing. Very careful designing to start with, and then very careful nurturing continuously throughout their operation; otherwise they will die. They are fragile flowers, they really are. And I think the evidence of the rice market really brings that home".*

Through the contract life, contract managers and their teams work on what they call 'product maintenance'. It involves monitoring the performances of the contract, especially the convergence, as well as modifying contract specifications to echo commodity markets, which are constantly evolving. Fred Seamon said, *"a futures market has to reflect the changes in the cash market, or the futures contract becomes obsolete".* While most scholars have only studied the failure of contracts in their early age, Till (2014)also explored the issue of obsolescence over time. It is one of four factors she lists to explain the failure of long-existing contracts. Interestingly, her definition does not exactly fit the narrative of contract managers. In their understanding, it is the failure to respond to certain physical market alterations that can be compensated by modifications of the contract specifications. In her words, obsolescence is the result of deeper and more radical transformations of the cash market. She refers to technological changes turning the commodity into "new and different products in their production, price and distribution patterns", or government intervention affecting the need for price hedging (Till, 2014, p. 9). In this case, the contract could not fit risk management purposes for the commodity anymore. To simplify, obsolescence, according to Till, is the loss of a prerequisite for the establishment of a contract. Obsolescence for contract managers is the failure to re-engineer the contract according to the needs. Both definitions are valid and important, but the similar labelling of these two issues can create confusion. Contract managers' definition matches Till's second explanatory factor better: a contract becoming disadvantageous for hedgers. However, my interviewees largely argued that the contract should not become disadvantageous to anyone in the market, whether hedgers or speculators. The main issue with affecting the hedging performance is that hedgers represent the root of the liquidity and without them, the market breaks the rational relationship between cash and futures prices. The reasoning of the previous section is still relevant long after the establishment of the contract. The disengagement for any reason of some market participants can further lead a rapid fall in participation and death of a contract as they will take away with them others who do not want to remain in a market losing liquidity.

Till's third factor is that the perishable nature of the commodity made physically delivered futures vulnerable to manipulation. Although the risk of manipulation – if it is obvious to market participants – already hinders the chances of a futures contract success at the start, manipulation of a contract can unexpectedly occur later in its lifetime[32]. For reasons that are beyond the scope of this thesis, it is largely understood that perishable commodities such as potatoes and onions are more exposed to manipulation. However, it is a mistake to think that only perishable contracts can be manipulated. All futures markets are potentially exposed to manipulation and such manipulations are a threat to the survival of the contract itself. Although repeated manipulation could lead regulators to force an exchange to delist a contract, this situation is very unlikely ever to happen. Instead, a heavily manipulated market is unlikely to survive as market participants losing faith in the fairness of that market are likely to withdraw. This will result in depleting liquidity until the death of the contract.

The last factor suggested by Till is competition. This is simply the idea that two contracts for the same commodity can hardly survive alongside each other. Carlton (1984) has shown that competition between exchanges can trigger contract failure. Pennings and Leuthold (2001) notice that competition between contracts can also happen within a single exchange. If the products traded are not different enough, they can take away trading volume from one another, leading to the failure of one of the contracts. They call this phenomenon cannibalism. Black (1985) also mentions that competition can come from other derivatives instruments such as a functioning forward market. This thesis does not delve into the details of the competition issue as it does not apply to rice; hardly one contract for a section of the rice market ever existed at a given time, so looking at competing contracts would not be relevant.

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[32] This happens mostly because of a change in the distribution of market power alongside the supply chain.

VII) Discussion

The theory of contract failure is of great implications for the rice market. As mentioned in the introduction chapter of this thesis, financial development is not a foreign concept to this crop market. The fact that rice has had many past contracts that have been traded or simply attempted, for today being very thinly traded through derivatives, shows the relevance of the theory of contract failure. The long history of futures trading in rice until World War II shows that, at least at the time, the crop met most prerequisites to the functioning of a futures contract. The end of futures trading in Japan in 1939 illustrated the concept of obsolescence, the one defined by Till (2014), as the control of the rice supply chain by the government put an end to the need for future hedging by market participants. However, in this thesis, the focus is onto understanding why there has not been a revival of futures contracts for rice since WWII. The theory of contract failure therefor serves to answer whether repeated patterns of contract failures appear on the rice market. By examining a number of rice contract failures (or partial failure) in subsequent chapters, it appears that most of the time, major contract engineering issues or Catch 22 did occur in rice, obscuring the role of prerequisites in contract failure. This means that the primary causes of failures were not shared by the different contracts that were not successful. However, I will go further and examine whether the prerequisites were fulfilled, and argue that they are not. In many cases, issues related, for instance, to politicization or market actors' propensity to hedge negatively impacted the prospect of financial development of rice.

In this way, the theory of contract failure and the case of rice feed each other. The various empirical example that the rice market provided and that I discuss through this thesis will confirm the applicability of the theory, in particular the part surrounding human input issues. However, as the occurrence of these issues impede the identification of failure to fulfil the prerequisite, having a full theory of potential structural causes making a commodity unfit for futures trading allows to examine the market structure underlying the past attempts at financial development of rice. In addition, as I compare rice to other crops for which some contracts managed to overcome the high probability of failing due to *ad hoc* issues, I am in a position to test the validity of the list of prerequisites. Coffee, wheat and sugar all fail, to some extent, to completely fulfil all of the criteria discussed in section III. I will show how they may not always have prices freely determined, homogenous market or perfect supply chain organisation. It puts these prerequisites into a realm where they are not binary but rather variables that influence the propensity of a commodity to develop financially. As a stand-alone issue, the absence of one condition such as homogeneity can be overcome under certain circumstances. I will for instance discuss the grading systems in coffee. On the other hand, by failing at sufficiently satisfying many of the prerequisites, rice has a very low potential for financial development.

Finally, the study of these crops in the coming chapters importantly shows under what conditions these prerequisites are likely to be fulfilled. For instance, I will argue that the combined geographical unipolarity of the rice market into the Global South and its role as a staple food made the likeliness of its prices being freely determined very low. The nature of coffee, a luxury good consumed in the Global North, made it more likely to fulfil that prerequisite and contracts succeed.

VIII) Summary

In this chapter, I proposed a theoretical model to explain what leads to the failure of many futures contract. I outlined the construction of futures contracts, starting from the theoretical prerequisites to futures market, before presenting the practice of building the right contract, attracting participation in the contract, while finally examining how all these elements need to be maintained through time. Futures contracts can fail at any of these stages. However, the replicability of one contract's experience only applies to the theoretical part, while the practice is case-specific. Through this thesis, I apply this model to the rice market. I show that although it is difficult to generalise from past failures as most rice futures have failed in their practice, the examination of the theoretical prerequisites indicate that rice was by nature difficult to develop a derivatives market for. In addition, the build-up of liquidity is limited by a variety of market organisation factors, such as the geographical distribution of market participants and their level of sophistication.

Chapter III: The Low Liquidity of the CBOT Rough Rice Futures

The CBOT rough rice contract, hosted nowadays by CME, has been the only futures for rice that has, through time, consistently maintained a minimum level of liquidity post-WWII. While it is a unique case in rice for its success, it is peculiar relative to all commodity futures contracts because it has survived for more than 35 years with low trading volumes and open interest. This chapter questions why this contract, which has managed to attract some minimum liquidity to survive, is failing at increasing participation further, which suggests limited financial development of the American rice market.[33] Indeed, this contract has been primarily developed to serve the needs of the US supply chain, with little correlation with the global market. Chapter VII discusses what the CBOT rough rice contract means to the financial development of the global rice market.

This case study is important because the US is a financially developed economy where most agricultural goods are already traded through derivatives. Therefore, the results of the research could show that there are reasons inherent to rice that would explain its issues with the development of futures. However, it appears that the reasons that will be highlighted in this chapter are often context-specific to the US rice industry. Despite that, the US case provides lessons on the functioning of futures markets, the importance of convergence, the role of sophisticated actors, the difficulty to generate liquidity and the interaction between futures markets and OTC markets. Some of the challenges that will be highlighted in this chapter will be echoed in other case studies of this thesis. In addition, I will discuss in Chapter VII how a liquid Chicago contract could have served financial development in other markets. Therefore, it was unavoidable, in this thesis, to settle the questions around the CME rough rice contract's struggle to succeed despite survival.

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[33]. In this chapter, I assume that this contract is purely a domestic one, as it is what it has been designed for.

In the first section, I introduce the issue of the lack of liquidity in the rough rice contract and connect it to issues of price behaviour. In the second section, I question whether fundamental contract flaws could explain this problem and conclude that it is not the case. In the third section, I argue that a reason for the small size of the CBOT rough rice market is that the underlying market itself is small. A large share of the American rice industry is, for a variety of reasons, not eligible to hedge risk on futures contracts for long-grain rough rice. Finally, I explain that the farmers (the remaining branch of the industry) that could use the contract rarely do so for two main reasons: first, their risk perception affects their propensity to hedge; second, unlike the wheat market, there are very few intermediary actors in the supply chain that perform the function of offering OTC contracts to give farmers indirect access to the futures market. However, these actors using it find it efficient and contribute to the survival of the contract.

I) Liquidity, convergence and basis issues

Chapter II highlighted the importance of the relationship between cash and futures prices, as convergence issues can be both a cause and a result of contract failure through its relationship with liquidity. This section investigates whether the rough rice contract is characterised by a phenomenon of catch 22. I argue that it is the case, although without causing the definitive failure of the contract.

"Liquidity – ease of getting in and out (of the futures market) without disturbing the price – is important" (Hieronymus, 1971, p. 38). This is how Hieronymus simply stated a fundamental aspect of all financial markets. As I previously explained, liquidity depends on the amount of participation in a contract. I often asked CME futures stakeholders whether there was an issue of liquidity in the rice contract. A casual *"oh yeah"* answered by a broker[34] was a simple summary of the market sentiment. Even Fred Seamon, the contract manager of CME, acknowledges the issue:

> *"Yes, it could certainly be bigger. It is the most and only liquid rice futures contract in the world … but yes the rice market is not as advanced as corn, soybeans, wheat, oats even. Oats is a dying market in the US but the oats*

[34] Interview with Scott Minton, CME Rice Futures Broker, Chicago, USA, September 2017.

market uses the contract more intensively than what rice does. Yes, rice is never going to be the size, based on its current design, of a corn or soybean contract, but it could be much larger than what it is."

There is no doubt that the volumes and open interest of the contract are small. John Morgan[35], the procurement manager of Supreme Rice Mill in Louisiana, explained that the small liquidity prevented many market participants from using the futures for risk management and pricing strategy, *"especially when it is trading 200 contracts a day. That's nothing. Two hundred contracts is 400k hundredweight; [every mill] in the US [is] milling more than that in a day."* He explained how, in the mid-2000s, his company sometimes represented 60 per cent of the contract's buying side. Similarly, during his time as director of rice procurement for Mars Inc. in the 1980s and 1990s, Milo Hamilton traded 40 to 50% of all US rice futures. Such shares of the market obviously create issues of market power and imbalance, as well as creating issues of liquidity for Mars due to the lack of trading counterpart. The question is not why those people could trade so many contracts, but why there are not more other participants diluting the volumes instead. Why are market actors reluctant to use the market for hedging and as a result, provide liquidity?

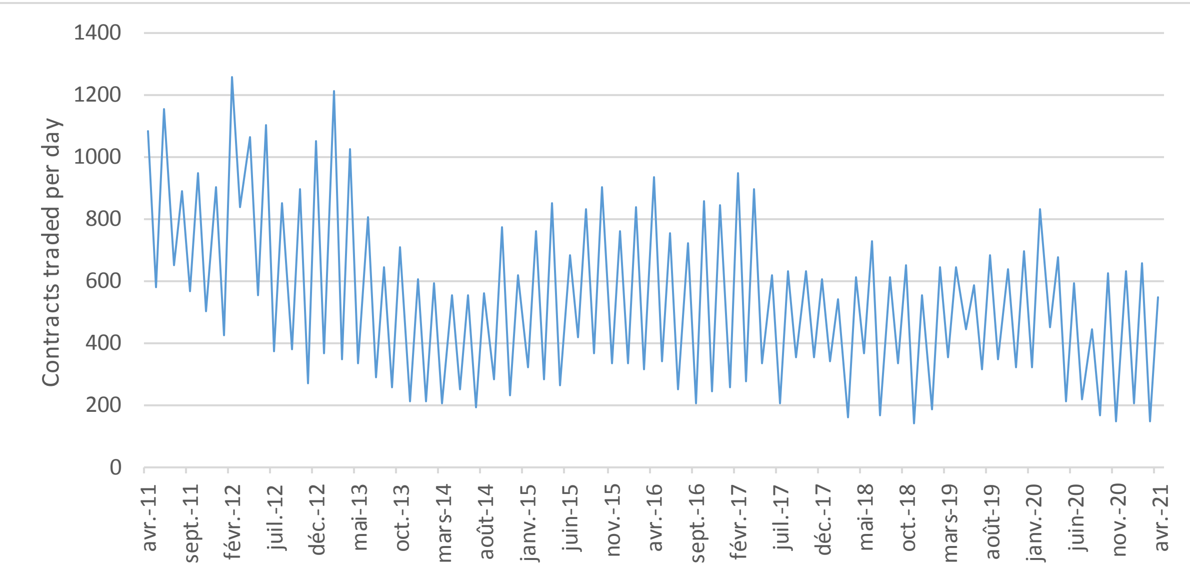

Figure 5: Monthly average of daily volume of trade in the Chicago Rough Rice contract

[35] Interview with John Morgan, Vice President, Supreme Rice Mill, Louisiana, USA, August 2017.

"Lack of liquidity comes from the danger of no convergence" John Owen[36] - a northern Louisiana rice farmer - said. He explained that in the past, the basis was sometimes 20% of the value of the cash, making the market nervous of using the contract for hedging. *"It is not true risk management if you have the spectre of non-convergence".* John Denison,[37] a farm manager on the Louisiana Gulf coast, described rice futures not tracking well the cash price, but considered the contract still good enough as a risk management solution. When voicing their concerns about basis, interviewees mentioned both the lack of convergence between the futures and cash at the delivery point, but also the fact that a lack of market integration could cause the basis in their geographical location to fluctuate.[38] Farmers were the most emphatic group about this issue. Jackie Lower,[39] a Louisiana farmer, argued that the basis in other markets, soybeans for instance, was more constant, predictable and tight than rice. For rice, the local price can swing under and over the futures. Because of the unpredictability of its basis *"you are not confident that the futures is as good as cash"*. If the basis does not simply represent the cost of carry and transportation costs, it means the law of one price[40] does not apply, so the futures does not function well as a substitute for cash. This chapter later explains that this basis risk affects the propensity of producers to enter the futures market.

Although the issue of convergence and basis was widely mentioned by interviewees, it has rarely been proven. Giesler (1998) studied the basis in Southwest Louisiana, where many of my interviewees operate. He found that in some years, the variations in the basis was larger than the variations in the futures price, suggesting a great deal of basis risk. McKenzie et al. (2002) did not focus on the co-movement of cash and futures over time but looked instead at the futures ability to forecast cash prices at delivery location and contract maturity. They examined whether market participants, who suggest pricing inefficiencies as a legitimate explanation for low participation in

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36 Interview with John Owen, US rice farmer, Louisiana, USA, August 2017.
37 Interview with John Denison, US Rice Farm Manager at Sweet Lake Land and Oil Co, Louisiana, USA, August 2017.
38 This is important because it increases the number of actors affected by basis issues. As Hieronymous explained, "for users of futures markets, the important basis is that one that applies to the operational problem at hand" (Hieronymus, 1971, p. 151)
39 Interview with Paul "Jackie" Lower, US Rice Farmer, Louisiana, USA, August 2017.
40 The law of one price suggests that in an efficient market, a similar good should be sold for the same price in different locations, with price differences only justified by transportation costs.

the futures, were correct. They found that the market was efficient at the time, despite being thinly traded. They concluded that "the rice futures market should be considered as both a potentially useful price risk management and forecasting tool" (McKenzie, et al., 2002, p. 492). However, a lack of data prevents the replication of similar studies since then. Interviewees explained that in other markets such as wheat and corn, convergence is constantly measured based on USDA's daily report of basis in many locations. The agency gathers elevator bids daily and makes these data public but does not provide similar services for rice. Without good daily price series, market participants struggle to measure convergence. *"So everybody kind of has their own idea on whether it is converging, but it is hard to really have that conversation without good cash data"* an interviewee explained. *"How do you measure convergence if you have a weak cash data service?"* another asked rhetorically[41]. Instead, traders, analysts, CME's product development and surveillance teams and government regulators rely on a weekly cash price provided by a floor trader. Not only does this impede the work of market surveyors, who cannot pin whether participants act economically as this opacity hides convergence, but it also impacts the likeliness to obtain convergence at all. *"With a more transparent cash market you are more likely to get convergence because you can see what the cash is, what the futures is, and the opportunity for arbitrage"* the interviewee continued. Therefore, market participants must arbitrage cash and futures based on their own understanding of market conditions. However, if their estimations are wrong, they may worsen the price gap between the two markets. The debate about whether prices converge and the futures performs its hedging function is not settled. However, the lack of compiled cash data means that the sceptics are not proven wrong and consequently refuse to engage in a market they do not trust, tightening the number of potential participants. An interviewee noticed that the small size of the resulting market means there are not enough participants to take part in arbitrage, making the convergence issue worse. This is a direct application of the theoretical problem of catch 22 discussed in Chapter II.

This catch 22 is reinforced at many levels. For instance, the illiquidity of the market means that it is easier to manipulate. Although there is no clear evidence that such

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[41] Interview with two anonymous US agricultural futures market stakeholders, USA, September 2017.

manipulation takes place, it is a concern for market participants and a disincentive for both hedgers and speculators. Even without malevolent manipulation, the absence of liquidity means that the futures price can be significantly disturbed by large trades. Rice commercials are particularly concerned by the action of large speculators. A miller[42] said it was a reason for their refusal to trade futures:

> *Miller: One of the things you'll see is if other commodities like corn really go up, the [speculative] funds will say "we need more of an Ag portfolio", so they'll dump a bunch of money into the futures market. So it will go up, not for supply and demand, just because people are trying to spread out their risk. … So you have to be careful about what the hedge funds are doing.*
>
> *SL: That makes you distrust the dynamic of the futures...*
>
> *Miller: Right, and if we get stuck into something like that, I don't know if we can survive it.*

In effect, the speculative interest in the futures contract is too thin. Many potential hedgers say they would use the contract if it were more liquid. However, at this low level of liquidity, the irregular and oversized participation of speculators can instead be harmful. What stakeholders complain about is not the speculators themselves but the size of the market that fails to dilute and normalise speculators' individual actions. If they were many speculators active in the contract, they would have less individual market power, would practice arbitrage and correct mispricing, attracting hedgers in return. However, as mentioned in Chapter II, they will not come without existing liquidity either.

One more effect of the contract's illiquidity is the little trading volumes and open interest being concentrated in the front month, as illustrated on a given day in Table 5. Trading activity more than three months into the future is rare. Interviewees noticed that it limits opportunities for pricing, backing up of OTC contracts and building long-term hedging strategies.[43] This is another reason for the restricted participation.

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[42] Interview with an anonymous US Rice Miller, Southern USA, August 2017.
[43] See section IV, f.

Rough Rice Jul '21 (ZRN21)

13.605s -0.050 (-0.37%) 05/14/21 [CBOT]

Contract	Last	Previous	Volume	Open Int
+ ZRY00 (Cash)	13.605s	13.655	N/A	N/A
+ ZRN21 (Jul '21)	13.605s	13.655	382	7,901
+ ZRU21 (Sep '21)	13.665s	13.675	56	2,236
+ ZRX21 (Nov '21)	13.765s	13.840	21	89
+ ZRF22 (Jan '22)	13.925s	14.050	3	3
+ ZRH22 (Mar '22)	13.925s	14.050	0	0
+ ZRK22 (May '22)	13.925s	14.050	N/A	N/A
+ ZRN22 (Jul '22)	13.925s	N/A	N/A	N/A

Table 5: Distribution of Open Interest in the successive Rough Rice contract months (Source: Barchart)

This section suggests a strong phenomenon of catch 22 in the US rough rice futures. However, it does not explain whether the low liquidity and convergence issues are solely caused by each other, nor why the contract stagnates at trading levels that are low but not null. In the rest of this chapter, I will examine whether other issues could explain the lack of participation in the CME rice futures, but also what motivates the ones who still trade the contract to do so.

II) Contract design issues

As the first American rice futures of New York and New Orleans failed because of contract flaws, I question in this section whether similar issues can explain the CBOT contract struggle regarding liquidity and convergence. Although I will argue that it is not the case, it is necessary to discard the hypothesis before examining the cash market mechanisms hindering financial development. Small disagreements always exist within the industry on the ideal specification but no consensus about one fundamental flaw was raised. Instead, when problems were identified, contract managers have been able to correct them. When asked whether the contract specifications seemed correct, interviewees agreed that CME contract designers were close to the optimal contract specifications. Most did not believe the specifications could explain the unsatisfying contract performances: *"I don't really see where it could* *be tricked",* a trader[44] said; *"I think it's not bad, I think it's close"*, a miller[45] echoed; *"I think the construct of the contract is as good as it is ever gonna get"*, a floor broker[46] summarised. However, most of them still flagged out things they think could be different. As the list of details is long, I only focus on two illustrative contract engineering problems that have been the source of most debates.[47] As these problem were solved, they proved that the illiquidity of the market did not rest in the contract participation.

During interviews, many argued that convergence issues might result from contract specifications discouraging participation delivery for arbitrage purposes. However, when I carried out my interviews, the main issue may have just been solved. The decision to transition from a warehouse receipt to a shipping certificate in the summer of 2017 was expected to be decisive. It was applied in 2018. The hypothesis was that the delivery instrument used was not convenient. When market actors participate in delivery on the exchange, what is transferred is not the actual commodity but instead a delivery instrument representing the commodity. A warehouse receipt is a proof of ownership of an amount of commodity stored in a warehouse (in the context of futures contracts, an exchange designated warehouse). "The warehouse receipt conveys the right to withdraw a specified amount and quality of the commodity at any time from the warehouse" (Höllinger, Rutten, & Kiriakov, 2009, p. 16). A shipping certificate is different in the sense that it does not represent ownership of the commodity standing in one place. It is instead a promissory note that a certain quantity of a commodity will be shipped into an exchange approved delivery facility within a designated period of time, when called for delivery (Sandor, 1973; CME Group, 2018). With the warehouse receipt system, warehouse managers were forced to fill up space in their warehouses for rice that could only be used for futures delivery. Its use of space was uncertain, depending on whether delivery would be asked for or not. The transition to shipping certificates gives the warehouseman a lot more space in storage, offering them more flexibility in terms of where rice can be stored and how the warehouse space can be used. They can now store rice away from the delivery point and still write a shipping

[44] Interview with an anonymous US rice futures trader, Illinois, USA, September 2017.
[45] Interview with John Morgan, Vice President at Supreme Rice Mill, Louisiana, USA, August 2017.
[46] Interview with Scott Minton, CME Rice Futures Broker, Chicago, USA, September 2017.
[47] Other potential flaws were occasionally discussed without finding consensuses, such as storage rates, quality delivered and computerisation.

certificate. More rice is therefore eligible for delivery. Shipping certificates were already used for all other CME grain futures. Rice was the last contract to use warehouse receipts. As shipping certificates are integrated into the exchange mechanism, they are registered on the informatics system, automating the calculation and paying of storage cost. The logistic of delivery is thus simplified.

The change of delivery instrument triggered optimism from most traders and processors. However, some doubted that the slight practical differences would change anything. To make delivery, the basis must be extremely tight, and if so, warehousemen would use the receipt anyway. Even if certificates enhance the eligibility for making delivery (warehouses can deliver more rice), there is no increased incentive for buyers to take delivery. Louisiana millers, for instance, have little interest in procuring rice through the exchange with delivery in Arkansas except under exceptional circumstances[48]. The exchange itself never claims that shipping certificates would impact convergence, only mentioning the automation of storage charges calculations and the increased flexibility given to warehousemen to manage delivery (CME Group, 2018).

The transition to a new delivery instrument could be classified as an upgrade to the contract. However, another issue, trading hours, was suspected to be a proper contract flaw. Back in 2017, interviewees extensively criticised the market trading 18+ hours a day. At the time, rough rice followed the normal Globex trading hours rules for grains. These include a normal day trading session for Chicago time, but also a period of night trade from 7 pm to 7:45 am the morning after. Night trading sessions aim to increase liquidity with participation from East Asia and Europe. However, the rice futures recorded little activity coming from these places. I explain in detail in Chapter VII that this futures contract mostly fits the hedging needs of the Western Hemisphere industry. There was no rationale for having it tradable in the Pacific area or Europe. Similar trading hours are used for other crops such as wheat. However, the wheat futures is very liquid; it takes a lot of people to move its price. The contract is also used globally, both for speculation and hedging.[49] The situation is different in rice. One interviewee said, *"you have an illiquid market already, when you take this at night*

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[48] The logistics of it is not favourable for millers on the coast.
[49] See Chapter VII

trade, at 3 in the morning, somebody can move the market 25cents on 13 lots, this is not a real market anymore". Rice traders and brokers commonly argue that night trade destroys confidence in the market. The price formation at night is not organised around the participants' common belief about where the price is heading, but instead around distortion created by very few players acting alone. An interviewee put forwards that those rules divided the open interest maximum potential by two. Another knew for a fact that some colleagues stopped trading rice futures for this reason. There was a sense in the market that these rules should be changed. Therefore, there was a tension between the understanding of the exchange that additional liquidity could be attracted internationally and the market participant, who believed it would only trigger less domestic participation.

An interviewee described a meeting in 2009, in Chicago to discuss the trading hours for rice. With approximately 50 people in the room, everybody but one person voted in favour of putting an end to night trade. One trader, who left the industry soon after, voted against because it benefited his option business. Without unanimity, night trade was maintained. In 2012, CME experienced different modifications to the trading hours (table 2) until it stabilised it in April 2013. However, the issue was solved a few months after these interviews. CME dissociated the rough rice trading hours from other contracts. Night-time trade became evening trade, making it more manageable for market participants. However, this did not result in the expected increase in open interests. Extended trading hours may not have served the contract, but it was not the ultimate factor impeding liquidity. This contract amendment only brought us closer to understand that the issue may not be rooted in contract specifications.

If there were a major flaws in a contract, rice would be the commodity likely to be fixed faster. The CFTC rules specify that the exchange can bring modification in a contract only when there is not yet open interest in the contract month. For certain commodities, open interest can go as far as two years in the future. Deciding to apply a contract modification can thus take an extensive amount of time. In rice, there is such little use of the contract far into the future and the exchange can usually modify the contract within six months and therefore experiment with a variety of solutions to an identified problem. Consequently, the issue of contract obsolescence is also less likely to happen to the rice contract.

Dates	Trading Hours	
	Globex	Open Outcry
Prior to May 21, 2012	6pm to 7:15am and 9:30am to 1:15pm	Floor – 9:30am to 1:15pm
May 21, 2012 Onward	5pm to 2:00pm	9:30am to 1:15pm
June 12, 2012 ONLY	5pm to 2:00pm	7:20am to 1:15pm
June 25, 2012 Onward	5pm to 2:00pm	9:30am to 2:00pm
June 29; Jul 11; Aug 10; Sep 12; Sep 28; Oct 11; Nov 9; and Dec 11, 2012 ONLY	5pm to 2:00pm	7:20am to 2:00pm
April 8, 2013 Onward	7pm to 7:45am and 8:30am to 1:15pm	8:30am to 1:15pm
January 22, 2018 Onward – *Rough Rice Only*[50]	7pm to 9:00pm and 8:30am to 1:15pm	

Table 6: Changes in trading hours at CBOT

It appears that the contract design issues (delivery instruments and trading hours) that many market participants believed to be key to contract failure have been fixed over the past few years. However, it did not result in a boost in liquidity, hinting that the contract flaws hypothesis can be rejected and fundamental problems are to be found elsewhere. The well-functioning contract specifications may even be responsible for the existing participation in the contract. While in this thesis, the failure of many futures contracts for rice appears to be due on circumstantial problems such as wrong contract specification, the US case gives the opportunity to look for structural factors for the financial underdevelopment of the market. It will be important to determine over the

[50] Open outcry for rice was discontinued in 2015.

subsequent chapters whether the factors exposed in the following sections are replicable to the global rice industry or only to the US market.

III) Size and structure of the American market

In the absence of major contract flaws, one should question whether other prerequisites to the success of futures trading discussed in Chapter II are not fulfilled for the US contract. Within those, I argue that the market size is critical to understanding the small open interest of the futures market for rice. The American rice market is small compared to the underlying markets of other major CBOT contracts for corn, wheat and soybeans (Table 3). However, the amount of rice that can be hedged on the exchange is even smaller. In this section, I look at rice grown in the US producing states of Arkansas, Missouri, Mississippi, Louisiana, Texas and California[51]. The size of the American rice market in 2017 is made of approximately 9 million MTS grown over 2.4 million acres. However, I argue that most of this rice is either not suitable for hedging on the CBOT or in the hands of market actors that have no incentive to use futures. This results in an even smaller underlying market and thus further liquidity issues. To forward my argument, I show that subsequent layers of US rice does not fit futures hedging, which discounts them from obtaining the remaining underlying market.

US Crops, Average Yearly Statistics, 2013-2018[52]			
	Area planted	Production	Value of production[53]
	(1,000 acres)	(1,000 bushels)	(1,000 dollar)
Corn	91 214	14 304 584	52 764 356
Wheat	52 007	2 026 210	10 611 850
Soybeans	84 265	4 077 311	39 897 967
Rice	2 771	455 610	2 694 747

Table 7: Size of US crop markets

[51] This section only focuses on the US rice market. I explain in Chapter VIII why the CBOT rough rice contract should not be expected to be a global contract upon which foreign rice could be hedged, for now.
[52] Data from the USDA, National Agricultural Statistics Services (2019) transformed by the author
[53] The USDA computes the value of production by multiplying the volume of production by a year average price for the crop.

The first market section to be discounted from the underlying market is the Californian industry. Californian rice, produced in the Sacramento Valley, is almost exclusively made of a medium-grain called Calrose, a Japonica variety.[54] As the main global supplier, California long held significant market power, which protected the few Californian co-ops from significant price risk. In 2012, a drought struck California, making the price of Calrose rise significantly. The industry decided collectively to plant less and keep the supply tight in the following years, expecting that the prices would keep increasing. Although this result was achieved, it also allowed competitors – essentially Italy and Vietnam – to enter the market, picking up the demand. Thus, there is more need today for Californian market participants to hedge prices than ten years ago. However, using the CBOT to hedge Calrose is not a viable solution as the spread between the two markets is inconsistent. The Calrose market does not closely correlate with the price dynamics of the long-grain traded in Chicago in the short/medium run, although common patterns are observed in the long run. This lack of opportunity for cross hedging was numerically proven by Yoon (2005) fifteen years ago. The two markets have not made significant progress towards cointegration since then. They are two clearly separated markets, both in term of geographical production and targeted consumer markets. They are not substitutable products. This fragmentation of the market thus does not fit the need for homogeneity of the crop.

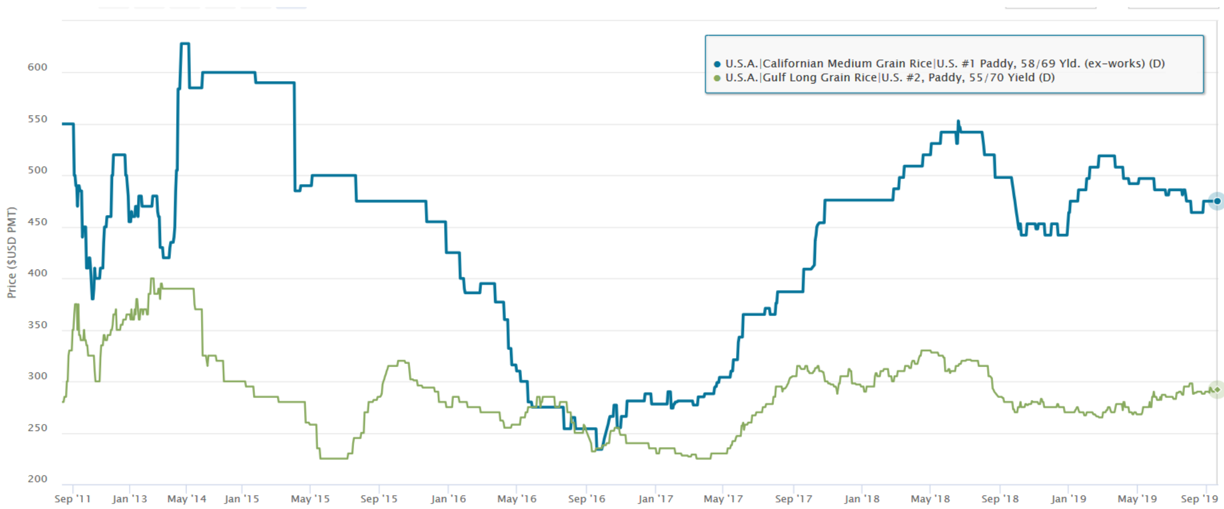

Figure 6: Californian rice and Gulf rice Prices (Source: LRI)

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54 This variety, used notably for sushi, is mostly grown in North-East Asia. However, neither Japan nor South Korea produces enough volumes to export their rice, historically making the USA the leading exporter.

Similarly, the patterns of the medium-grain market in Southern states are very different from the long-grain one. This market is dominated by Kellogg's as the essential end users. This variety is used to produce their famous *Rice Krispies* cereal. Interviewed farmers and millers explained that producers would not dedicate acres to plant medium-grain unless they already had agreed with a buyer.[55] This means that Southern medium-grain is essentially grown within the framework of contract farming. Farmers agree on an area to plant, either directly with Kellogg's or with a miller having a similar arrangement with Kellogg's (or another end-user). Since the price is usually set before planting, hedging is already effective, and there is no need for any additional derivative instrument. For the few cases when the price is not set previously, the long-grain market can be used as a pricing indicator, since growing medium-grain equates an opportunity cost of not planting long-grain. However, a miller stated that the medium market was much more stable than the price for long-grain, in part due to the small number of actors involved. The Southern medium-grain market is therefore not contributing to the underlying market size for CBOT either and the entire production of US medium-grain should be discounted. The tiny production of US short-grain, essentially from California, follows the same logic and will be discounted from the total.

What is left is a long-grain Southern market, composed of two major geographical sub-markets. The river market is composed of two regions of production – the Arkansas Grand Prairie and the Mississippi Delta – starting from southern Missouri and following the Mississippi river onto North Louisiana. Within this sub-market, Arkansas is the leading producing state. Its total rice production is almost the size of the total rice production in all other US states. The Gulf market is found in South Louisiana - around the Acadian area between Lafayette and Lake Charles - and the Texan counties along the coast, on the other side of the state boundary.

[55] As this is a very specific market, producers only plant if they have a demand for their rice. Kellogg's thus needs to contract in advance to secure supply.

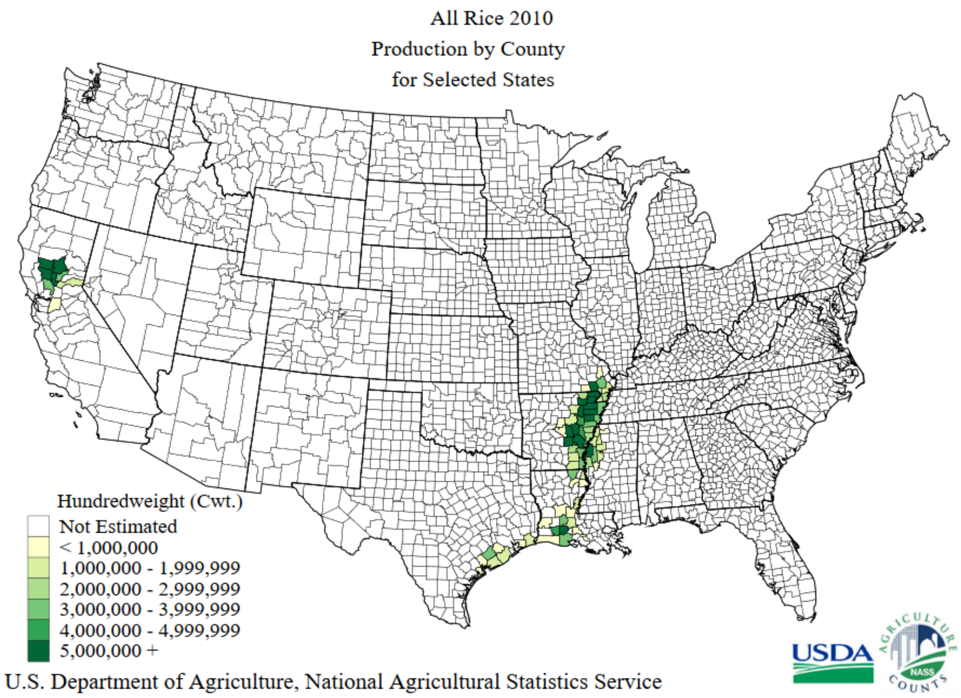

Figure 7: Rice Production in the US

The market in Arkansas is dominated by two major farmer co-operatives: Riceland Food and Producers Rice Mill, Inc. It is difficult to know precisely what share of the American market is in the hands of the co-ops. Numbers suggested by interviewees range from 40% to 60% of the Arkansas rice market, with 60% more often cited as the reliable number.[56] Riceland is active in Missouri and Producers in Mississippi, controlling similar shares of production in those two states. Together, these two co-ops represent a problem for futures' liquidity. Co-ops pool rice from farmers for free, mill the rice, marketize it and sell it to long-term retailing and branding partners they have long-term pricing partnerships with. Their own brands of white and brown rice can even be found on the shelves of American supermarkets. Farmers are only paid once the co-op has sold the rice: they receive payment by the volume of rice provided to the pool, but that price is only determined afterwards upon the selling price out of the mill. They also receive a percentage (based on their share of ownership in the co-op) of the value-added through milling and marketing the rough rice. The procurement and marketing mechanisms leave Riceland and Producers with essentially no hedging

[56] I will use the number 60% since it is commonly cited by the industry participants. Greenwall (1995) evaluated the co-ops' share of the Arkansas Market to 65% in the 1990s, and it is not believed that their market power has significantly declined since then.

needs. On the one hand, co-ops pool rice from farmers without a purchasing price. The origination cost for the raw material is zero. An interviewee said that their risk management tool is simply the farmer's price being unknown until the entire deal through the supply chain is over. On the other hand, their selling price is usually fixed long-term. When it varies – which happens rarely – it is usually by a small amount and is simply transmitted to the price paid to farmers. As a result, the rice handled by Riceland and Producers is rice that will not be hedged on CBOT, making the market smaller once more.

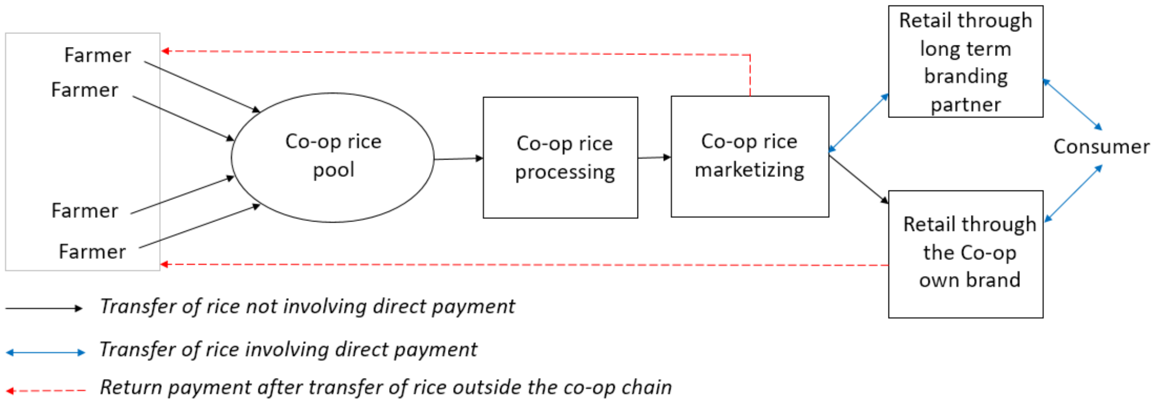

Figure 8: American rice co-ops supply and payment system

Amongst the market actors interested in having a functioning futures contract, there is a lot of frustration towards the co-operatives. Louisiana farmers, millers, brokers, traders and even academics reproach them for not playing the game, for trying to impede the contract and for limiting price discovery (Taylor, Bessler, Waller, & Rister, 1996; McKenzie, et al., 2002). They suspect them of protecting their market power by restricting competition. Some interviewees explained that co-operatives sometimes use futures when convergence fails. An experienced rice futures trader[57] explained:

> *"there are occasions when the market gets way out of line, the rice futures prices two dollars below their milled rice, then they're going to buy the futures, or they're going to sell puts. They are going to do something because it is too*

[57] Interview with an anonymous US rice futures trader, USA, September 2017

cheap. And the same thing if it gets too high, they are going to hedge the rough rice because it is more lucrative than to mill it."

In the long run, co-operatives have an interest in inconsistent performances from the CBOT contract. On the one hand, they take advantage of it when it goes wide, and on the other, it discourages farmers from breaking free and marketising their rice themselves. If the futures was a reliable hedge, more Arkansas farmers may be willing to be independent as they could more easily manage risk. Such lack of participation from the co-ops to protect share of the market fits Gray's (1966) theory of disposition to boycott a futures contract as a measure of market power. However, a rice broker said that the number of farmers leaving the co-ops structure increased over the past few years, amid low prices they would obtain for the farmers and the suspicion that they are managed in the interest of the staff rather than the farmers. He stated that the loss of market share was so important that they had to procure rice outside of their pool and that he had himself supplied them rough rice in the previous years. This suggests that more of the grain could become available for futures trading with time, as farmers enter the competitive market on the one hand, and the likelihood that co-ops may need to hedge their procurement price increases on the other.

The frustration of futures enthusiasts against the co-ops is understandable. However, from the co-ops' point of view, not trading futures is rational since there is no risk to hedge. One cannot contribute to financial development as a commercial without physical risk to trade. However, critics argue that with the volumes they hold, they could use the futures to make additional profits and at the same time, increase the liquidity for the whole market. The managers of both co-ops have declined my requests for interviews, making it difficult to fully comprehend their sentiment towards futures trading, and determine whether they are actively boycotting or simply not profit maximising organisations. It should be mentioned that there is a broader context of critics against the co-ops. For instance, there is a general understanding that the co-ops are not making efforts to maintain the quality standard of the market. Instead, they try to produce as much as possible to fill up their milling capacity. As this results in oversupply, low prices, and loss of quality reputation for the whole market, there is anger against the co-ops. It partly explains why certain stakeholders criticise the co-ops approach to the futures contract, even if this approach is rational.

An interviewee noticed that this market power held by the co-ops was very much a specific attribute of the rice market that was not found in other American grain markets.[58] A grain analyst working for a co-op[59] explained to me how the functioning of co-operatives in wheat, corn and soybeans encouraged the use of futures instead of impeding it. Unlike in rice, wheat co-operatives do not pool the grain from farmers to process it. Instead, they pay the farmer at delivery and ensure the storage and marketing of the crop, rarely the milling. They are only an intermediary in the supply chain, often between the farmers and large trading companies such as Cargill, Bungee or Louis Dreyfus. Since they hold the grain in a liberalised market with prices determined freely, and the large number of them involves competition and little market power, wheat co-operatives are exposed to high price risk. Co-ops, therefore, use futures for two reasons: to manage short-term price risk in the first few days following the purchase until deciding what to do with the grain, or long term risk (it could be a year) if they decide to use the futures market to lock in a storage profit. They can do so because there is trading activity in the far away months of the futures contracts for wheat, while this is not the case for rice. As an additional example of the causality dilemma of liquidity, it is also their need to hedge in the long run that generates this liquidity in the far away months. Therefore, the co-ops are an asset for the wheat futures contract but a problem for rough rice futures. The presence of co-operatives in other grain markets thus does not invalidate the argument that they play a role in the financial underdevelopment of rice. It is instead the nature of the co-ops and their position in the supply chain that determines whether they will be an asset or a limiting factor to the size of the market.

To conclude, as the US medium-grain and short-grain market, as well a large share of the Arkansas production is not available for hedging on CBOT, I calculated what is left as an underlying market for futures trading. I present the calculation for the year 2017 in table 7.

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[58] Co-ops' market power tends to be an ad-hoc function of a market. It is not, for instance, a function of market size. Although the market is small in the US, the Japanese rice market illustrates how a large market can be dominated by a single co-operative (see Chapter V).
[59] Interview with an anonymous commodity markets analyst, Illinois, USA, September 2017.

2017	Production (1000 MTS)	Percentage of US production
Total US Rice	8 911 400	100%
Californian Medium-grain	- 1 715 400	- 19%
Southern Medium-grain	- 678 000	- 8%
US Short-grain	- 125 550	- 1%
Co-ops share of AR-MS-MO Long-grain production (60%)	- 2 742 660	- 31%
Remaining Rice CBOT Hedgeable	3 649 790	41%

Table 8: Rice hedgeable on CBOT

While the US rice market was understood as significantly smaller than other commodities financially developed through a contract listed on CME, this section showed that the structure of the American rice industry results in an underlying market that is less than half of what it could be thought to be. This shows that the US rice market hardly fulfils the cash market size criteria for a successful futures contract. This issue does not occur in the other crops mentioned. These markets are well integrated with systems of price premium and discount for quality and geographical differences, allowing most of the domestic production to be hedged on futures markets. Additionally, the nature of co-ops in these markets supports the use of futures contracts.

IV) Lack of participation from farmers and the role of processors

The previous section argued that a large share of the American rice market was not eligible for hedging through the CBOT contract. However, in the residual market, some participants are involved in futures trading while many chose not to. If they did, the open interest could be substantially higher than it is. Therefore, the rest of this chapter aims to explain what motivates the decision to hedge with futures or not. Due to their number, significant risk exposure and position in the supply chain, it is often suggested that the farmers part of the residual market could be the ones generating liquidity. In addition, farmers often take part in risk management through derivatives for other crops they farm, indicating a certain level of sophistication. Therefore, I inquire why American farmers, especially in Louisiana, rarely hedge rice price risk with futures. My argument revolves around two variables: (i) the price risk faced by farmers is diluted by factors related to farm management and public policy, putting farmers under less pressure to hedge; (ii) the access to futures market is made difficult for farmers as a result of a lack of OTC contracts offered by processors and intermediaries.

a. Production risk outweighing price risk

For farmers, price uncertainty over a season can be difficult to isolate from a multiplicity of other issues creating business risk for rice producers. The case of Luke[60], a young farmer from Eunice in South Louisiana, illustrates the complexity of risk perception profiles found in the region. A hypothesis to explain the low use of futures to hedge price risk is that some farmers feel more exposed to the variability of production than to the variability in prices (Lapanand & Moschin, 1994; Pannell, Hailu, Weersink, & Burt, 2008; Lence, 1996). The uncertainty about the quantities to be harvested results in farmers not knowing what volumes should be hedged on the exchange and thus choosing to not hedge at all. Using the illustrative case of Luke, this section argues that the irreconcilability of the two types of risk for some farmers prevents them from using derivative contracts.

Above concern about rice price shifts, Luke dreads crop loss. He is reluctant to sell forward because of potential failure to deliver. South Louisiana is a hostile environment for farmers in need of yield guarantees, due to the tropical cyclones that hit the coast from the Gulf of Mexico during summer, around harvest time. In the second year after Luke took over his father's farm, he faced one of the most important natural disasters in the US during the 21st century: the 2016 Louisiana flooding. This was caused by a "no-name storm" which, as noted by the *Washington Post* at the time, generated three times more rainwater in Louisiana than Hurricane Katrina did 11 years earlier (Samenow, 2016). The days before this tropical depression hit Louisiana were decisive for farmers. As crops are insured (to cover for potential yield loss), they usually take decisions over crop management in agreement with their insurance company. The inconsistent forecast made decision-making complex. Luke's insurance company was not sure about harvesting the rice. When he discussed with them on Monday 8th of August, the rice moisture was still up to 23%, making it dangerous to harvest. Farmers usually cut the rice anywhere between 16% and 19% moisture. Once it is put into the grain bin, fans placed underneath the bin blow air on the rice through

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[60] Interview with Luke D., US rice farmer, Louisiana, USA, December 2017.

little holes on the floor to dry it out. If the rice is too moist, the system does not work and the bin can even catch fire.

> *“I didn't really want to cut it. They said we would get a little bit of rain but... this was on the Monday. I'll cut a little bit, maybe a truckload at 23%. We were not sure how much rain we were going to get. So I said ‘I don't want to burn the bin down or whatever’. So I waited. And by the Friday and Saturday, that's when we knew the rain was coming. It was unbelievable. It rained 15 inches overnight, something like that, and the whole place flooded.”*

300 of Luke’s 400 rice acres got severely affected. Luke gave me pictures of his field after the water had gone down. The desolation of the scene could not justify the abandon of the crop, the insurer was willing to minimise the losses. “*They said ‘go ahead and cut it… save what you can, it's better than nothing’*".

Figure 9: Flooded rice field

Luke eventually managed to cut his rice and obtained a yield that was not as low as could be expected. In his area, farmers consider 50 barrels per acre to be a good yield. That year, he made 39 barrels per acre. *“That’s about average, that’s pretty good”.* The insurance company consequently did not pay for yield loss. It later appeared that the rice was damaged as it had sprouted. The milling quality turned out to be very low. While Luke sold his paddy for $16, he only got $13 from the mill. The insurance partially covered the difference.

While Luke managed to get through this situation without major loss, the devastating effects this rain had on some of his neighbours left a mark in his mind:

> *"At least I have been able to cut. Some people stayed under water for a month; they couldn't cut. It was already regrown; it had sprouted. As you can see in the picture, the sprout is really small. The root coming out, it's tiny. Theirs was green. You know what rice is like when it's a month old. They couldn't even cut it; they lost the whole thing. The guys I am talking about … he lost the whole thing. It was maybe 100 acres. The insurance … didn't want to pay. ... They paid some, but he never got back the time, the diesel, the equipment, the fertiliser, the water. There is so much expense! … So I think the company let the land go and somebody else picked it up and I don't know what the boy is doing..."*

Figure 10: Rice that started sprouting

Luke showed a risk understanding common to many farmers of the US Gulf. They balance price volatility against weather and production risk volatility, understanding the second as the greatest source of risk for their business. By locking in prices and then pledging a quantity of rice to be sold, farmers would significantly increase their financial risk. However, risk understanding varies from farmer to farmer. Jackie Lower, who is based on the Gulf, thought price risk was greater. While feeling exposed to price variations, he thinks that major storms are rare, despite having occurred two years in a row. However, the increasing frequency and larger scope of tropical storms due to climate change might shift this understanding. It appeared to affect younger farmers more because extreme weather damaging their crop already occurred many times since they started farming. Therefore, they perceive it as a normal recurrent phenomenon, compared to older farmers, who often have the sentiment that these years are only outliers within the many decades they have been farming.

The tropical storm of 2016 was not Luke's first experience making him cautious about selling forward. In the first year of farming without his father, Luke sold rice forward to a mill through his broker. However, when came time to ship out, he was 5k barrels short of what he had on the book. Unsure of why his calculations were wrong, Luke thinks it might have been due to shrinkage. *"They wanted their rice; I was freaking out".* By chance, his second crop that year made exactly 5k additional barrels. *"I was able to cover the contract. I guess that is why I don't do [forward sell]. I like to have my eggs before I sell them".*

Luke dreads the miller's reaction if he was to be short on the contracted volume. Whether the buyers would allow him to make it up the following year or if he would have to compensate the loss in cash, Luke was not sure. It appeared that Luke did not have an issue with locking in a price for the coming crop, but he was not comfortable contracting for a quantity. He believes there is not enough price risk to justify the use of derivatives in the context of high yield uncertainty. Theory of optimal hedging suggests that farmers perceiving production risk will reduce the quantities they hedge (Lapanand & Moschin, 1994; Lence, 1996; Pannell, Hailu, Weersink, & Burt, 2008). Some farmers believe from experience that not only is there uncertainty in the quantity produced, but they may even lose their entire production to weather events. The climatic instability on the Gulf thus hinders some farmers' propensity to hedge price risk.

It can be questioned whether the issue of production risk really is a unique characteristic of the US rice market, or if it affects every farmer regardless of their location or crop. Would wheat farmers be less affected by production risk? It is beyond the scope of this thesis to quantitatively measure the level of production risk faced by different farmers under a set of different factors. However, it is possible to explain why US rice would be a special case. The first fact to remind is that the issue is not having production risk, but having production risk that outweighs price risk, at least in the perception of the farmer. I am not suggesting that no wheat farmers in the US Midwest has a great deal of production risk. Some may be farming in areas particularly prone to droughts, tornadoes or hail. However, considering the wide geographical distribution of wheat cultivation in the US, all farmers cannot be in a situation where they have more production risk than price risk. Some might, but others will be in climatically more stable regions and would, as a result, prioritise price hedging. In contrast, most farmers expected to use the US rough rice contract are concentrated around the cyclone-prone Gulf of Mexico and therefore share this characteristic of high production risk. Another hypothesis is that it is not necessarily the crop risk of wheat farmers that is low, but that they are facing a greater deal of price risk. Ultimately, the fact that many wheat farmers do take part in derivative markets through OTC contracts (I discuss these mechanisms later in this chapter) is enough evidence that they do not face the same production risk versus price risk dilemma as Louisiana rice farmers do.

b. Diversifying price risk

Luke illustrated another important element in the farmers' approach to price risk: diversification tends to push farmers to be less concerned about hedging one crop (Asplund, Forster, & Stout, 1989). This subsection argues that many farmers in Louisiana are highly diversified, resulting in a lack of urge to hedge rice. Like most farmers in the Cajun region, Luke's production rotates between rice (the main crop), soybeans, and crawfish. The diversification creates different hedging needs because the price risk is not concentrated into one market. Crawfish may even be a key in understanding the hedging behaviour of farmers like Luke.

Crawfish does not exactly constitute a rotation. It is rather a complementary use of the land primarily serving for rice. Luke calls that a "double-crop". When the rice is about to emerge, in June, he adds water to the field and throws in crawfish. This is called stocking. The crawfish bury in the ground. The water can then be taken off the field for harvesting in August. In October, water is put back in the field; the crawfish comes out of the ground and can now be fished.

This aspect of farm management is crucial for many rice farmers in Louisiana. Despite taking an important place in the farm activity, rice becomes secondary when it comes to income. *"I am looking into break even or make a few dollars"* with rice, said Luke. *"But the crawfish is where the money is at. So I don't worry too much about the rice."* Crawfish is not only a high-value product that does not need much input, it is also a source of income less affected by uncertainty. Another farmer[61] confirmed that once the crawfish investments of the first year have been made, it becomes a profitable business that has helped a lot of local rice producers. For many of them, farming rice has become a way of providing an environment for crawfish farming[62] more than a primarily profitable business (Thier, 2012). John Denison, the farm manager in South Louisiana, told me a similar story about producing honey, as rice fields provide a habitat for bees, an important part of their business. Under these circumstances, farmers are hoping they will be able to make marginal benefits with rice. As long as the price does not fall dramatically below cost, the farmers' risk aversion is lessened by the production of those other more lucrative products.

All farmers interviewed in Louisiana were engaged in diversification practices. They usually have up to three other sources of income. Apart from crawfish, other crops included sugar, cotton, wheat, corn or potatoes, depending on the nature of the land, or cattle farming. Farmlands are also used to make an income out of tourism activities such as fishing, duck hunting or eco-tourism. I always asked my interviewees if such diversification, apart from increasing revenues and making good use of the land, was also a form of risk-mitigation strategy. The answers were consistently affirmative: *"absolutely; no question about it!", "it is a very important form of risk management, diversification is key", "it's a backup system you know".* Farmers feel that the probability of all their income sources failing at once is negligible. Consequently, they are less in need to lock in a price. Unfavourable market movements represent a financial loss but are unlikely to be dramatic for the economic performance of the whole

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[61] Interview with an anonymous US rice farmer, Central Louisiana, USA, August 2017.

[62] The rice field serves as an ecosystem to feed the crawfish.

farm. When diversification involves other crops, it also mitigates crop risk, since all crops do not react the same to extreme weather events. Some crops even have different production timelines, further mitigating the impact of sudden or longer-term weather issues. If the diversification is in the form of cattle farming or tourism, the weather may even have less impact. Finally, when it comes to farming other commodities, which are often financially developed, farmers have the opportunity, and often do hedge their production, which makes them more likely to try to play the market for potential benefits using storage with rice, instead of attempting to lock in prices. I discuss the hedging vs. storing decision in the following section.

Diversification is less common in Arkansas, where farmers are encouraged by the co-ops to entirely plant their fields in rice to fill up the capacities of processing facilities. However, once again, farmers there do not face the same price risk as farmers around the Gulf as their supply channels are of different natures.

c. Soybeans rotation affecting risk behaviour

Many of Luke's peers share the feeling that the volatility in rice does not justify the use of hedging contracts. Interestingly, finance professionals in Chicago repeated that the volatility prerequisite for a functioning futures contract was a given. Why then, don't American rice farmers perceive this risk? The answer might lie in the relativity of risk in rice and soybean farming.

I did not mention soybean in the previous section because it does not exactly constitute a diversification in the business sense. Farmers grow soybeans essentially for soil management, rather than for its profitability. For most cereal farmers in the American Midwest, soybean is the sister crop of their main grain. It can be found in the northern states, such as North Dakota, which produce corn, alongside the Mississippi river where Winter Wheat is the main crop, and down to Arkansas and Louisiana where rice is produced.

Every farmer I talked to in Louisiana grew soybeans on their farm, always within a logic of field rotation. Soybeans help replenish the ground with nitrogen needed to maintain the yields of grasses such as wheat, corn and rice. Interviewees explained that the results are so good that even when soybeans are not profitable "*farmers would really rather stick to their rotation. At the end of the day, they make more money that* *way."* Soybeans also allow for better control of weeds to obtain a clear field, using Roundup, a herbicide, during this time of rotation with rice.

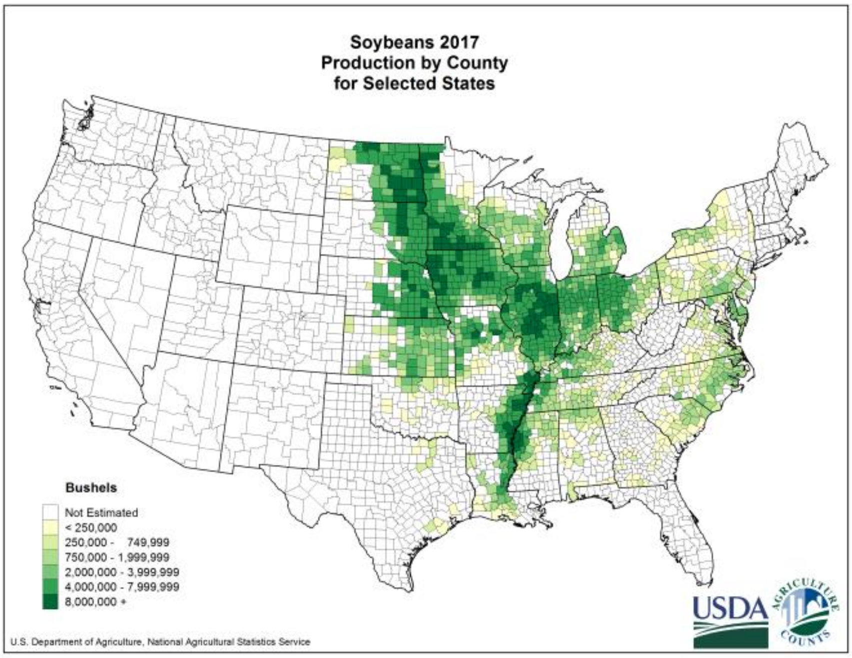

Figure 11: Soybean production in the US

Although rice farmers primarily plant soybeans for land management, cultivating the crop has deeper reaching effects on their business and risk behaviour. Some farmers had a sense that swings in soybeans prices were more dramatic than in rice, justifying more price hedging. However, this is not confirmed by numbers. Between August 2014 and August 2019, the volatility of the rice futures contract was higher than the volatility of the soybean futures contract (I provide the results of the volatility computation in Appendix C). Apart from an exceptional day in rice on the 18th of August 2018, the largest price movements of both markets were comparable. The average price movements were also very close, although rice was slightly higher in both cases. A reason why Louisiana farmers may feel that soybeans are riskier is that the price fluctuates around their cost of production and it is this which decides whether it will be a loss, a profit or a break-even. In rice, the price is usually consistently above the production cost; price changes only affect the extent of the profit.[63] However, farmers

[63] This was often argued by market participants. It was not possible to triangulate this information as calculating production costs is difficult.

see soybeans as a riskier business than rice mostly because the former – a more fragile crop – is rarely stored on-farm. Additionally, truck drivers pick up soybeans in priority over rice because they are being paid more for driving the beans. Consequently, farmers tend to use their storage space for rice rather than soybeans. Soybeans leave the farm shortly after harvest while rice can be stored for months, sometimes years. Farmers are thus price takers at harvest time for soybeans and exposed to a great deal of risk. They use derivative finance to either price ahead of the harvest or use a stay in the market to price after having moved the crop.[64] Instead, the ability to keep rice in their bins for long gives farmers flexibility to marketise their crop. If the price is low at harvest, they keep the rice, wait for prices to bounce back before selling. They may sometimes take wrong marketing decisions and sell while the trend of the market is not favourable, but at least they are taking a fully conscious decision. Despite that, storing should not be thought as the ultimate hedging solution for all farmers. First because some of them do not have the storage capacity of keeping all their rice on farm. Second, because they need a flow of revenue and holding on to the rice may not be an option. Still, the case of soybeans sheds light on the importance of the ability to store in the risk management of the crop as the greater flexibility to store rice reduces the pressure on financial hedging.

Therefore, soybeans have a double effect on farmers. On the one hand, it contributes to their sophistication as most farmers engage in OTC contracts to sell their soybeans early or secure stay in the market contracts,[65] but it also alters their risk perception as it relativises the risk implied by rice farming compared to the very uncertain nature of selling soybeans on the spot.

d. Farm program

Another disincentive to farmer's participation use of futures is the relative protection by the federal government through the Price Loss Coverage (PLC). As it establishes a minimum price for a share of the production, the risk is lessened. However, I also

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[64] The need to secure a destination for the beans is such that production risk is this time outweighed when deciding whether to use forward contracts.
[65] If a farmer needs to move their beans but believe prices are increasing, they can sell the physical commodity and buy a long derivative position. As a result, they are "staying in the market".

argue that this only impacts the need to hedge to an extent, as the mechanism of this program does not cover all downward price movement.

The 2014 farm bill (which was itself largely renewed in 2018) established a reference price of $14 per hundredweight. It is compared to the so-called effective price, a national average market price received by producers from August of the production year to July of the following year (113th United States Congress, 2014). If the effective price falls below the reference price, the difference is covered by the program. It acts as a minimum farm price protecting farmers from price below cost. Producers mostly agree that the farm program functions well as a safety net. Interviewees said that it does not make rice farmers less risk-averse but makes them better protected against price risk. It takes away some price risk from being hedged with futures. However, I argue that the farm program affects liquidity but does not justify the absence of hedging by farmers. Some elements suggest there is still a raison d'etre for futures alongside the farm program:

- Remaining need to hedge: Farmers still have an incentive to hedge with derivatives and capture higher returns in case of price fall, whether the effective price is above or below the reference price:
    - If it is over and the PLC is not triggered, a derivative contract can act as a higher safety net. However, market prices have been below the reference price since the farm bill has been put in place, so this is only a theoretical situation.
    - Even if it is below, as the reference price is an average, it falls slower than the cash price. Unless the farmer sells their crop for an amount equal to the US average cash price, they are not guaranteed $14. By selling forward or cash, at the beginning of the falling trend, they will capture additional revenue. For instance, if they sell forward in May at $13 and the average price from August to July is $11, they will receive an additional $3 that will bring their revenue to $16.
- Limitations: Several restrictions in the mechanism of the PLC do not make it as good as the revenue from cash sell and hedge. Firstly, the payment will only come 18 months after planting as the average price is calculated in the following 12 months after harvest and compensations are paid in the following October. Secondly, the payment is only applied to 85% of the base acre of the farm dedicated to rice. If a farmer plants all their eligible acres for rice, 15% of the production will not be protected. Finally, the payment is limited to $125k per farmer, and $500k for the farm. A farmer estimated that he and his peers need

individually to gross $1.5M to $2M revenue to make a living. In case of significant price fall, the PLC would thus not be enough to cover losses.

The impact of the farm program is thus not explicitly determined. On the one hand, it does not remove the logic behind the theoretical benefit of using derivative finance to hedge price risk. However, it is likely that certain farmers feel no need to hedge due to the PLC, while there is only less need. Since 2014, open interest has been lower in the rough rice futures than it had been in the previous four years, when the Food, Conservation, and Energy Act of 2008 had in place a much lower target price of $10.5. However, the correlation of the policy change with the stabilisation of open interest at a lower level does not firmly demonstrate causation either.

e. The 'This is not my job' narrative

Apart from the fact that the risk perception of farmers drives them away from futures hedging, they are also reluctant to participate in the futures market because they believe that it is not their place. Farmers have the sentiment that they expose themselves to a great deal of market risk by being active directly on the futures. In this section, I argue that they are right. There is a misconception that farmers are commercials like any other and that they should participate in futures trading. This is shared by some staff members of commodity exchanges of sophisticated participants in commodity markets. That explains the popularity of programmes made to train farmers in the functioning of futures trading. Even many academic researchers question the lack of farmers' use of futures contracts, and usually define not hedging at all as the only alternative. These include Shapiro and Brorsen (1988), Pennings and Leuthold (2000) and Lence (2009). This section allows me to deconstruct this idea before the following section exposes how farmers should become involved through simpler intermediary contracts. This supports a similar argument made by Paul et al. (1976) and Tomek (1987).

The narrative that using futures markets is not part of the farmer's job is fed by the confusion around how farmers use futures contracts. In the theory of agricultural economics, farmers, as other commercials, are almost exclusively perceived as hedgers. Accordingly, they are expected to use futures markets to lock in prices they will receive upon delivery and transfer price risk to speculators. However, I explain in this section that farmers' behaviour is more complex and can explain their tendency to abandon the futures market.

Once they trade a number of contracts above a level determined individually for each commodity, futures traders have to report to CME and the CFTC through a document called Form 40. This is regardless of whether they self-identify as commercials (producer/merchant/processor/user) or non-commercials. The exchange and the regulators strictly require commercials to use the contract for hedging purposes only, while non-commercials use it for speculation. Non-commercials are restricted to a position limit – a maximum number of contracts they can hold at one time – while commercials can apply and obtain a hedge exemption that allows them to go over this limit in order to manage the price risk of their entire cash positions. Importantly, positions are not individually designated as hedge or speculations; it is based on the status of the futures trader. The exchange and the commission cannot differentiate these positions within the activity of a single trader. However, when it comes to market surveillance, commercials will have to justify their position as a *bona fide* hedge if they are being asked to by the CFTC. Farmers must consequently use the market only to lock in profits, not to take advantage of the market and make additional revenues. This is at least the case with their commercial accounts. They have the option to do so by opening a second, non-commercial account if they wanted to speculate. Jack Scoville,[66] a Chicago based futures broker, explained that he is okay with his client farmers speculating as long they separate the two activities, allowing them to justify their trades to market surveillance and their personal accountant.

However, discussions about whether farmers could speculate on their commercial accounts are rarely necessary, as there is a third category of futures market participants: non-reportable traders. Those who do not go over the threshold of a certain number of contracts traded do not have to report to the CFTC, regardless of whether their positions are for hedging or speculation. Most farmers are likely to fall under this category.[67] Farmers can cultivate a blurry line between the two activities. In practice, they do. Some interviewees were vocal about their peers making mistakes

[66] Interview with Jack Scoville, CME commodity futures broker, Chicago, USA, September 2017.
[67] For rough rice, the position limit is 50 contracts, worth 4550 MTS of rice. A 400-acre farm would produce around 1400MTS of rice a year (using the average US yield per acre in 2018).

when speculating, saying that farmers should only be hedging on futures markets, especially because they are likely to lose as speculators. Others openly said they were speculating more than hedging, while many used the expression “to play the market”. One farmer illustrated this use of futures:

> *“We have [used futures] a couple of years ago, we saw the price was going down, we sold and bought the futures back thinking it was going to turn around, it never did. And that wasn't a good move, not at all. We are still trying to recover from that. So we are long now on the move back up. We won't get back all of that; we will get some of it back. So we will play with futures that way." He continued later: “[I only know one farmer] who can keep the dividing line between hedging from speculating. Because it is so easy to get caught in that speculative trap and think you know better than the market. That can be expensive.”*

In fact, the line between hedging and speculating is not so well defined. Speculators only trade futures by establishing a position and closing it out at a subsequent time with an offsetting trade, in an attempt to take advantage of price movements they expect to maximise their net revenue (Anderson & Danthine, 1983). The status of a hedger is more complex, especially when it comes to farmers. By synchronising their activity in the cash and futures markets, a pure (or routine) hedger, who formulates no judgment of price expectation, sells risk and ensures that his revenue will match his investment plus a predetermined profit (Johnson, 1960; Gray, 1960). Some authors argue that the activity of farmers on futures markets is far more complex. Anderson and Danthine (1983) state two important hypotheses: the first being that each futures participant has their own price expectation, which may or may not be equal to the current futures price. The second is that the farmer’s problem is to choose a quantity of input and pick a futures position that will maximise their expected net revenue, instead of laying off risk as the literature can suggest. Thus, there is a profit opportunity in the price expectation. As a result, the authors understand that “every hedger’s choice of futures can be usefully viewed as the combination of a pure hedge and a pure speculation” (Anderson & Danthine, 1983, p. 374). They find that hedgers hedge their output (either entirely, under conditions of production certainty, or partially, according to risk aversion in case of production uncertainty) "prior to readjusting their position, as speculators, on the basis of the expected futures-cash price differential"

(Anderson & Danthine, 1983, pp. 375-376). They add that “a rational hedger always speculates (that is, hedges ‘selectively’) unless he does not expect the next spot price to be any different from the current futures price” (Anderson & Danthine, 1983, p. 376). The term of selective hedging has been proposed by Gray (1960) who equates it to speculation by producers within the context of thin markets where producers cannot rely on consistent convergence and instead expect to find a bias between cash and futures at the end of the contract period. This reduces the effectiveness of routine hedging but increases the incentive to speculate to achieve maximal profit. That is not the case in more competitive markets where convergence is consistent and "the positions of rational hedgers would be closer to routine hedges" (Anderson & Danthine, 1983, p. 376). The rice market fits the model of thin futures markets, blurring the line between hedge and speculation. Hieronymus clarifies this hedge/speculation debate by stating “to hedge is to insulate one’s business activities from price level speculation while retaining the opportunity to speculate in a basis variation. This definition takes hedging out of the academic context of risk shifting and puts it in the business context of trying to make a profit” (Hieronymus, 1971, p. 149).

The issue is that managing such futures activity requires an advanced level of sophistication of the market actor. It involves an advanced understanding of futures trading, that can come at the expense of a learning cost, the ability to formulate unbiased price expectations, and most importantly, the great cost of managing positions – especially the management of margin calls[68] (Pannell, Hailu, Weersink, & Burt, 2008). Pannel et al. argue that those combined costs are so high that “the greatest incentive to adopt hedging instruments will occur in situations where the main benefit is increasing expected profit through speculation, rather than hedging risk” (Pannell, Hailu, Weersink, & Burt, 2008, p. 49). In fact, participating in futures trading activity for hedging or speculative purposes is simply too demanding on a daily basis for farmers. A rice and sugar farmer in central Louisiana, told me he felt comfortable using the futures market directly but did not think any money could be made from it. The use of futures did not make a difference to his revenues. In his opinion, rice

[68] Participants in futures markets must deposit a percentage of the value of their position to the clearing house, to guarantee their ability to cover possible loses. If the value of their positions increases, they are required to increase the deposit - this is called a margin call. Small market participants are consequently at risk of being unable to finance margin calls.

farmers should only focus on growing their crop, because "*this is where the money is made*". If a farmer is not good at farming, they will not have the quantity and quality of the crop to make money regardless of their positions on the futures market. Focusing on futures trading would be polluting for the mind of the farmer, according to this farmer. This was a sentiment also echoed by Luke. A narrative grew during interviews about what farmers should be expected to do or not and when it came to being active on a futures markets, they often argued *"this is not my job"*. There is no money to be made by trading actively for the farmer because they are "*an amateur in the market dealing with professionals. The people who are trading in the futures market, that's their crop they are raising. That's all they're doing. And you don't have much of a chance. It's almost like putting a rescue football team up against the pro team".* I consistently encountered this narrative of farmer's discomfort towards futures trading. Jackie Lower answered his own question about the fundamental reason why farmers don't trade the contract, making it a thin market, by saying *"Farmers who use futures… few used it and did well, as a hedger, but there is so many more than that have used it at some point and got burned. So they stay away from it."* Interviewees often reported attempting to use futures at some point, losing money through bad decision making, and never coming back. They did not always do so themselves, but recall instead, the bitter experience of their fathers. This fits the argument of Pennings and Leuthold (2000, p. 916) that "the decision to use futures is not solely made by the farmer, but it is also influenced by the opinions of others", especially family members. As a result of personal or their relative's negative experiences, for many farmers, the futures market represents more of a risk than a safety net.

"I think they are terrified of being wrong" about their hedging strategy, Milo Hamilton[69] told me. In fact, farmers are right – trading futures contracts and active financial risk management should not be part of their professional attributes. To benefit from a futures market, less sophisticated farmers should instead be offered (and use) OTC hedging products offered by intermediaries rather than managing their positions directly on the futures market and produce their own financial strategies (Paul, Heifner, & Helmuth, 1976; Tomek, Effects of futures and options trading on farm incomes.,

[69] Since he has left his position at Uncle Bens, he advises market actors, primarily farmers, about marketing strategies.

1987). However, this offer is rare in the American rice market, and the following sections attempt to explain why.

f. Processors: the missing key

The condition for increased participation in price risk trading on the rice market does not lie in the direct participation of farmers in the futures market. Instead, commercial intermediaries would be the key to the development of derivatives trading. By serving as the bridge between the farmers and the futures market by offering OTC contracts, they increase both the sophistication of the market structure through an increase in derivatives instruments and increase the ability of farmers to trade risk since those contracts are tailored to their needs and constraints. In this section, I start by illustrating the functioning of this intermediary level of financial development on the American wheat market before explaining the failure to build such a system in the American Southern rice market.

i. Intermediaries on the wheat market

In the US, the wheat market illustrates indirect access to futures contracts. The commercial participation in CME futures is greatly due to the variety of OTC derivatives offered to farmers by intermediaries, whether they are elevators, co-operatives, brokers, grain merchants or processing companies.

Brorsen and Anderson (1994) have listed two alternative options to the use of futures for farmers. While I discussed spreading the timing of sales before, I look this time into the forwarding option. Forward contracts are the most basic type of access to price risk management offered to wheat farmers, mostly by local elevators (Henderson & Fitzgerald, 2008). The basic price formula for a forward contract is the price of the futures contract plus the local basis. Forwards present, for farmers, a variety of advantages over futures. They solve the issue of managing margin calls, as well as basis risk for farmers since they deliver the grain instead of financially settling against the futures price (Nelson, 1985; Mark, Brorsen, Anderson, & Small, 2008; Taylor, Tonsor, & Dhuyvetter, 2013). Nelson (1985) finds that lumpiness (the difference between the desired quantity contracted and the quantity specified by a futures contract) is another factor why farmers, especially smaller-scale ones, prefer forwards: since futures contracts are standardised, the contract size is likely to not match the optimum quantity to be hedged, which results in over-hedging or under-hedging. As the quantity contracted through a forward contract is decided *ad hoc*, this issue does not arise. To lay off the risk induced by such forward contract offerings, elevators need to engage in another offsetting derivative. One option is to buy a subsequent forward with an exporter, a flour miller or any other end-user that will carry the basis risk and hedging cost (Brorsen, Coombs, & Anderson, 1993). However, such contracts are not necessarily consistently offered. Often, the elevator offsets the risk on the futures market instead, taking on a short position. Therefore, it will assume the basis risk and hedging costs, although those costs are often passed on to the farmer, in the form of a premium included in the forward contract (Brorsen, Coombs, & Anderson, 1993; Townsend & Brorsen, 2000; Taylor, Tonsor, & Dhuyvetter, 2013). The main reason for elevators to offer the contract is to ensure their supply of wheat (Mark, Brorsen, Anderson, & Small, 2008). As elevators need to offset their long positions in those OTC contracts with a short futures position, farmers indirectly generate liquidity in the wheat futures market.

Elevators also offer alternative contracts to farmers, giving them more flexibility on the way they marketise the wheat. Apart from forwards, two main types of contract can be used: hedge-to-arrive contracts (HTA) and basis contracts. Both involve delivery agreements similar to those of a forward contract. HTA contracts allow fixing the futures price while leaving the basis between the futures and the local cash price open. This is interesting for farmers if the ongoing basis at contracting time is wider than the normal average basis. Elevators will cover the HTA with a short futures position. The basis can be established anytime between when the contract is signed and delivery. Until the basis is established, an HTA is the equivalent of a futures position for a farmer as it leaves basis risk open, except that they will be able to lock in the basis when they wish, and they are not exposed to margin calls. Basis contracts offer the opposite opportunity. The basis between the futures and the local cash price is established upon signing the contract, while the futures price remains open. Those contracts are interesting for farmers when the basis is narrower than normal or is likely to widen while they are not ready to fix the futures price, as they believe this one will increase. Just as for HTA, the farmer can fix the futures price when they wish, converting the basis contract into a forward. To cover for their obligations to buy the grain, elevators need to take a long position in the futures market until the futures price in the basis contract is fixed.

By making these kinds of contracts available, elevators increase the sophistication of the market structure since it widens the derivatives instrument alternatives to futures. Forward contracts, HTA and basis contracts increase the opportunities to trade risk and, most importantly, to pack or unpack price risk and basis risk. Additionally, they contribute to the increasing of farmers' ability to trade risk since those contracts are tailored to their needs and constraints, especially avoiding issues of margin calls. Finally, by involving farmers indirectly in futures markets (as OTCs need to be covered by futures positions) they trigger an increase in open interests. This is likely to attract a larger pool of speculators, creating the liquidity necessary for farmers who would want to be directly active in futures.

In addition, other market participants get involved in providing risk management tools to farmers based on futures. For instance, the marketing branches of certain farmers co-operatives[70] can set up contracts for producers to perform hedge functions for them. I interviewed an analyst in one of these co-op owned companies in Illinois, who worked with the co-operative system to offer OTC pricing solutions. He explained that one of the popular products is an exotic cash grain contract: these are OTC accumulators, priced on the model of Asian options. Those contracts price a commodity continuously over a period of time, often against the futures market. For instance, a producer wishing to sell 10k bushel of rice in 100 days from the day he enters the contract, would see 1/100 of his crop being priced against the futures every day during that pricing period. This means 100 bushels would be priced every day in relation to the prevailing market price. This allows smoothing price variation, reducing the impact of large market movements. Hedging also comes in with the application of *ad hoc* price floors and ceilings. The seller and the buyer agree on certain limits for the contract. If the price goes over and under those limits, the volume yet to be priced is entirely priced at this price floor or ceiling. These contracts can be constructed in many ways, with varying levels of complexity, since they are made *ad hoc*. Co-operatives are not the only ones offering such contracts. Big grain trading companies such as ADM and Cargill also do. This shows how the variety of market actors are

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[70] These are not milling co-operatives pooling the grain and holding it all the way to retail like in rice. Instead, these are input and marketising co-ops that do not take part in milling the grain. Instead of pooling the wheat, they provide farmers with fuel, fertilisers and seeds, while also helping them to move the grain down the supply chain.

involved in the development of the derivatives market through the involvement of farmers. However, it is worth noticing that all these prices mechanisms also rely, for pricing, on the good functioning of the futures' price discovery, thus requiring an advanced degree of financial development.

ii. Lack of rice millers' participation in access to the futures

Such widespread use of OTCs offered by intermediaries to farmers is nowhere as common on the rice market as it is on the wheat market. If the farmers' concerns about using the futures directly is real, the absence of a large OTC market is a problem of a different nature. Milo Hamilton soon referred to this issue faced by farmers:

> *"They have a basic problem, that is, if you go from the north of Arkansas south, with the exception of one firm along the gulf coast, Supreme Rice Mill, nobody will offer the farmers a stay in the market idea, as a pricing mechanism. … You can do that on your own by funding options and futures. But the problem with funding futures as an individual farmer is that the price can double or triple on you, and then suddenly you realise your banker you thought was a friend is no longer a friend."*

Milo was raising the recurring issue of financing futures trading and managing margin calls. Interestingly, he referred to futures as the alternative solution to OTCs, confirming the sentiment that OTCs should be the default optimal instruments used by farmers in grain markets. This subsection explores the reason behind the lack of OTCs offered by intermediaries. I argue that most millers do not find the need to use futures contracts for themselves, limiting the financial development in the first place. In addition, although some farmers do forward contracting when it is offered, the manageability of their price risk, discussed earlier in this chapter, means that they are not under an uncontrollable pressure to become more sophisticated; this would force millers to offer these solutions.

The structure of the rice market and the farmers' ability to store rice implies that the next actor in the supply chain is often not an elevator but a mill. Therefore, before mentioning the price risk management opportunities offered to producers by their trading counterpart, it is necessary to look at the processing options available to farmers, as processors would be the ones that could offer those OTCs. In fact, the number of options for farmers is limited. In Arkansas, the processing is dominated by the two co-ops that compete with only a handful of smaller mills. In Louisiana, one mill is the main destination for rough rice in the north - Kennedy Rice Mill. Kennedy's subsidiary in South Louisiana, Planters Rice Mill, was closed in the weeks before I arrived in Louisiana in the summer of 2017. This left the gulf area of Louisiana with only three mills. In Acadia, Crowley, a town self-named the rice capital of the US, two mills face each other on both sides of a little road: Supreme Rice Mill, a large processing facility, and Falcon Rice Mill, a smaller entity. Further west, next to the border with Texas, Farmers Rice Milling Company also processes a large share of the gulf rice. Two more mills can be found on the other side of the Texan border: Beaumont Rice Mills and Doguet's Milling Company. In addition, a couple of intermediaries in the area can help farmers to sell their paddy directly in Central America where it will be milled. As each mill operates essentially in its area, it leaves farmers with little option but to sell to that mill.

As mentioned before, Supreme Rice Mill is the only entity consistently giving farmers access to the futures market by contracting with them and managing their positions. This is mostly due to one person, the Vice President and procurement manager John Morgan. Actors of the Louisiana rice market recurrently referred to him when it came to futures. *“John Morgan would explain that better than me”* was a frequent comment by my interviewees. This illustrates how rare futures market expertise is in this industry, while it is common in others. After studying accounting and finance at LSU, John Morgan worked in the gas industry in Texas, before joining Supreme Rice Mill. His experience in a financially developed industry such as energy trading contributed to his own sophistication as a market actor, which he brought with him to the Louisiana rice industry. He manages the price risk of the mill using the futures to avoid being caught between his long and short physical positions while processing the rice. However, more importantly, he offers OTC solutions for farmers. These are short-term forward contracts where the mill bids in August before taking delivery in September/October. More importantly, John Morgan offers basis contracts and HTA to farmers, just like in other grains markets. He also offers unpriced contracts for which he takes delivery of the grain after harvest but constructs an average price based on futures between August and November. John Morgan offers these contracts partly because he believes that the development of derivatives facilitates risk management for all market participants, facilitating everybody’s business. Most importantly, offering such contracts allows him to retain his supplying farmers as he provides them with more than a destination for their rice. For the farmers willing to hedge with derivatives, this becomes a key element in the choice of the mill they work for. That Supreme Rice Mill offers these contracts is significant for the financial development of the gulf coast market as it increases the ability of farmers to take marketing decisions depending on their risk appetite. Many farmers I interviewed referred to the OTC offers from Supreme Rice Mill as a game-changer. Some explained that they used to sometimes feel limited by their financial education to use futures, but they were always listening to what sort of hedging solutions could come from this mill. John Morgan was helping them making coherent marketing decisions. John Denison, the farm manager, explained to me the difference between managing his own futures positions to shifting to OTC in those terms:

> *"Twenty-four years ago [when he first took his job] the mills did not offer me any futures services for rice. I was forced to do it myself. Now this mill is offering me the use of the futures market to help manage my price risk. So it's a lot more efficient and cheaper to let them do it than having my own broker's account. I would have to provide my own margin, manage that margin. So that's one less layer of administrative cost that I can cut out. They're bigger, they have a bigger portfolio, they can manage it a lot better than I can manage it directly myself."*

If John Morgan and Supreme Mill are a hedging solution for farmers, he stands as an exception in the Gulf. Other millers are not active in offering hedging solutions; some do not even hedge for themselves. I aimed at understanding why. Firstly, for smaller mills of the southern market, their restricted storage capacities mean that they do not hold the grain for more than two or three months. In addition, since they also sell spot, they can adjust their selling price. Only for the rice that goes directly to retail under the mill's brand can an issue arise, since retailers will require a 60-day notice to adjust the price on the shelf. However, millers perceive that as a minor risk. As a result, despite the possibility of being sometimes squeezed between buying and selling, some millers do not believe they have a real need for risk management for themselves. Also, some millers have a sense that the futures do not perform well enough to be used. They echo the issue of liquidity exposed in section one of this chapter, arguing that the speculative funds can move the market widely and that the convergence is not consistent enough to be trusted. Some millers have expressed the wish to use the futures contract if it was liquid and consistent, but believe that at this stage, it is not viable.

In terms of providing solutions to farmers, this does not seem to be a concern for other millers. They understand the futures market exclusively as a tool to potentially hedge their own risk. As they do not believe in doing so, they naturally do not think that offering access to the market to farmers would make sense either. More importantly, they do not have the full expertise to do so and little incentive to develop it because of the lack of competition. As mentioned before, one mill often dominates one geographical area, leaving farmers with little choice where to deliver the rice. As a result, the mills do not have the same pressure in securing the supply of grain as wheat elevators have, pushing them to offer OTC contracts. However, this could change with the opening of new channels, involving exporting rough rice directly to Central America, which millers are deeply concerned about. Milo Hamilton told me that millers do not understand that their job, according to him, was not only to process the rice but also to lay off risk for the market. This was confirmed by a miller saying he did not think he had to involve futures in his business, as it had been functioning well for years without. Interestingly, the millers who complained about the lack of liquidity in the contract do not perceive that they could generate this liquidity by attracting the farmers in the market through offering OTCs. This is one more expression of the catch 22 of market participants wanting liquidity but rejecting the responsibility of creating it.

Millers are not necessarily the only intermediaries that could help farmers gain indirect access to the futures market. Milo Hamilton pointed to merchants, such as elevator operators, that take possession of the rough rice before it is milled. Equally, brokers or even exporters of rough rice could perform the hedging for producers. However, the rice market is stuck in this vicious cycle of lacking the expertise in derivatives trading. Therefore, to many it does not seem worth acquiring. A broker[71], who earlier in his career worked for a mill and ran an elevator, told me clearly that he advised his farmers clients to use the futures but without telling them how because his own knowledge was not complete enough. When he had his own elevator, he hired a professional to manage his futures positions. Bigger trading companies could help farmers access the futures like they do in grain but would in fact not do it because the volumes handled

[71] Interview with a US rice broker, Louisiana, August 2017.

by rice farmers are too small. The size of market agents in rice acts as an obstacle to financial development.

The financial education of farmers is not responsible for the lack of liquidity. Most farmers simply follow the marketing habits of the commodity they trade in. It does not take much financial knowledge for farmers to use OTC contracts. They have always done so to sell their soybeans because it is the standard of the industry, but do not question their absence for rice. John Morgan confessed that still most of the farmers he works with do not use his OTCs and explained clearly that most of the rice purchased is on the spot. It takes time to transform the marketising practices of an industry. However, just as on other grain markets, the more common those products are, the more they are used by farmers. So far, the offer of OTCs has attracted the consumption, rather than its demand forcing the supply. The discussions about risk perception, diversification and the rice program that came earlier have also suppressed the vital need for forward pricing. It is beneficial for farmers, but the difference in doing so or not is not significant enough to put pressure on millers. The farmers that are not pursuing price hedging are not acting as profit-maximising individuals.

Many times my interviewees argued that the demand for OTCs might increase in the future as many new American rice farmers have gone to university in recent years, and most of them have studied agricultural economics in colleges of the Midwest. As a result, their awareness of the functioning of derivatives in other grain markets may put pressure on intermediaries to offer basis contracts and HTA. To sum up, the increased sophistication through education of new market actors that are young farmers could pressure other market actors, the processors and merchants, to become sophisticated themselves in order to create derivative products that will increase the sophistication of the market structure. This will, in turn, lower the requirements for farmers to be involved in risk trading, sophisticating them further.

V) Discussion

Diagnosing the situation of the Chicago Rough Rice contract is difficult because it is an exception within two spheres. Within the US commodity markets, rice futures are a failure because they remain mostly unliquid. However, within the context of the largely financially under developped rice market, it is mostly a success. The fact that market participants who stay away from derivative trading make conscious decision not to do so is almost unique in the rice industry.

At first glance, both the success and the failure of the Rough Rice contract seem highly specific. The small size of the physical market and its internal organization making very little of the crop eligible for trading on the futures market, the issues of production risk exacerbated on the Gulf coast and the particular model of diversified farming in Louisiana, as well as the small numbers of millers being mostly unfamiliar with futures trading, are characteristics unlikely to be often met in American crop markets. Similarly, there are *ad hoc* features of the US rice industry that guaranteed some success, but these were unlikely to be found elsewhere on the rice market: the financial sophistication of few key market players such as Milo Hamilton, John Morgan and a few farmers and the fact that the US is the most financially developed country in the world, with CME the largest commodity futures exchange on earth, are example of this singularity. However, that does not mean that the experience of the CME rice contract is not of significance to the general study of financial development.

The first major takeaway of this case is that the failure of a market to develop financially does not have to be caused by a single factor. Instead, it can be a case of multiple issues colliding. All the issues discussed in this chapter individually, such as the farm program, the ability to physically hedge of the lack of OTC offered by farmers all deplete liquidity. If these issues had not arisen, the market would likely be a little more liquid. This confirms the idea that instead of being prerequisites, we are mostly examining variables that modulate the level of financial development that is achievable.

The other key lesson of the case of the US Rough Rice market is that the profile of industry participants is key to the process of financial development. Although it matters, this goes beyond the simple analysis of the actors' sophistication. Their propensity to trade risk depends on their risk preference determined by their business practices. This, in part, will determine their willingness to enhance their sophistication. If a farmer is exposed to a great deal of price risk, or a miller needs to offer OTCs to get clients, it is likely that these actors will push to acquire the level of sophistication required.[72] The business profile of market actors therefore needs to occupy a large place in the study of financial development. For instance, the ability of market actors to hedge physically or diversify alter their propensity to hedge.

It is not only the propensity of market actors to hedge that matters, but also the propensity of key market actors to boycott a contract. The case of American rice co-ops not wishing to give farmers the ability to manage their risk independently shows how financial development can weaken the market power of some actors. The study of market power is, therefore, also necessary and should be continued through this thesis. This chapter illustrates how a few actors controlling too much of a market make it less likely to develop financially, either because these actors will refuse to participate in derivative trading and deprive financial markets of liquidity, or because when participating, they will create an unbalanced futures market. This narrative about key actors suggests that, beyond contract managers only, different individuals can determine the outcome of financial development.

Finally, the case of the US gives a first example of the importance of the relationship between OTC markets and futures markets, both through the successes of the wheat market and the failure of the rice industry to trade risk. Futures markets serve as an outlet for the risk traded between less sophisticated physical market actors, while OTC trading backed up with futures contract provide the futures market with additional liquidity. Financial development is therefore contingent to the existence of physical market stakeholders acting as financial intermediaries.

VI) Conclusion

In this chapter, I examined the low liquidity phenomenon in the US rough rice futures market. The lack of participation in the contract implies inefficiency in the futures pricing relative to cash and results in further convergence issues. As a result, the contract is not considered by many participants as a viable solution. Therefore, there is doubt that they consider the market structure as sophisticated, despite the existence

[72] This argument needs to be moderated by reminding that all variables are not in the control of these market actors. I will argue in Chapter VI that farmers in Southeast Asia do not have the same potential for enhancing sophistication.

of the futures contract. I subsequently tried to examine why only a few market actors chose to use the futures contract. Firstly, I argued that there seems to be no major contract flaw and the few issues found, benefiting from the possibility of quick fixes for the rice contract, have been solved since my time in Chicago. However, this did not result in increased liquidity; reinforcing the argument that contract specifications are not the source of the problem.

Subsequently, I examined the size of the American rice market and found that a large share of the rice produced in the US was not eligible for hedging on the CBOT contract. This is in part because certain varieties do not correlate with the long-grain rough rice covered by the contract, but also because the co-operative marketing system in place in Arkansas does not involve price risk that would justify the need for hedging. The thinness of the cash market underlying the futures could thus explain some limitations of the liquidity. However, the Louisiana and Texas market, where I carried out my research, could legitimately use the futures. Despite that, most stakeholders there do not. This is particularly critical for the exchange when it comes to farmers because their number could represent an important source of participation. I argue that expecting farmers to participate directly in futures trading themselves is misplaced. Transaction costs are too high for them to be directly active on futures markets. They do not do so on other markets either but instead use intermediaries. Some farmers acknowledge the benefit of OTCs and use them when they are provided by a miller. However, these farmers were often sophisticated enough to attempt using futures contracts before. Others are less interested in derivative contracts because, despite price volatility, the level of risk is suppressed in various ways, such as diversification and the farm program. In addition, some have the perception that the crop risk is higher than the price risk. As a result, these less sophisticated producers do not pressure processors and other intermediaries to become more sophisticated and provide indirect access to the futures market. It transpires that a lot of these issues are the result of long-term habits. Nevertheless, there seems to be a prospect of slow market transformation that would see more sophisticated actors involved, eventually contributing to the sophistication of the market structure and resulting in the accelerating dynamic of financial development of the US rice market. For now, the level of liquidity, allowing the contract to remain listed, is provided by sufficiently sophisticated actors alongside the Gulf coast, such as John Morgan and his client farmers. This emphasises the important role of physical market actors in the process of financial development.

This case study teaches us important lessons for the study of the development of a derivatives market, beyond the US rice market, that will re-emerge in later chapters. One is the importance of the interaction between the futures contract and an OTC market. For example, the Vietnam case in Chapter VI will show that targeting coffee farmers for direct liquidity in local coffee futures has caused damage to the futures market. I also exposed how the market actors' risk profile and their ability to manage risk away from derivatives plays a part in the success of futures. In particular, the US rice farmers' habit of managing risk through storage will be met again with Thai rice exporters. This chapter has demonstrated that even a well-engineered contract could face difficulties in increasing the sophistication of the market structure. Finally, the vicious cycle of non-convergence was illustrated. This constant threat of illiquid deliverable contracts is a key notion to assimilate. I will argue in Chapter VII that not needing convergence is one strength of the emerging model of non-deliverable index contracts.

Chapter IV: The Political Burden of the Rice Market

"So… rice is involved in a lot of politics" a US rice trader told me as they spoke at length about rice price volatility. Although only a brief mention, it hinted one of this thesis' hypotheses for explaining the low financial development of the rice market. In the previous chapters, it appeared that the US farm program influenced the propensity of farmers to use the Chicago rough rice contract. Although I do not argue that it is a major hindering factor in the US, it was a first hint that government interventions in the physical market might influence the use of futures. In this chapter, I investigate whether the politicization of rice could affect the prospect of functioning derivatives in the wider market. This comes to question whether the condition discussed in Chapter II, "price freely determined", is a missing variable that can partially or fully explain the lack of financial development in rice.

This chapter argues that the strong politicization of the rice market, and the way it affects the market, is an important factor in its inability to develop financially. Despite this, I reject the idea that every politicization of an agricultural market is enough to counteract all dynamics of financial development. I start by defining the concept of politicization and articulate the forms it can take. I subsequently explain why politicization is usually expected to be an obstacle to the financial development of commodity markets. After briefly discussing the political salience of food markets in general, I detail why rice is the most political crop of all. I illustrate this with the case of rice in Thailand. Thereafter, I engage in a comparative exercise, by showing that the low politicization of the wheat and coffee markets seems to confirm that financial development thrives in the absence of government intervention. However, the case of the sugar market, a highly politicised market with functioning futures contracts, will raise doubts about politicization as a single factor against financial development. Furthermore, a detailed comparison will help understand that all forms of politicization are not equal when it comes to their impact on price risk. Compared to other agricultural markets, the politicization of rice is characterised by its unpredictability and its impact in all exporting countries. Therefore, I argue that the politicization of rice suppresses the liquidity of derivatives for rice, but that the case of sugar, and to lesser extent wheat and coffee, show that even when prices are not freely determined, there is a scope for futures contracts to function.

I) Understanding politicization

a. Defining politicization

The term politicization is often used in the commodity finance, agricultural economics and political economy of food literature. However, it is largely undefined and used as a self-explanatory concept, or as a substitute for another concept: government intervention. These interventions can come in the form of market regulation, supervision or participation, or alteration of market mechanisms. Politicization is mostly understood as the opposite of liberalisation.

I distinguish between politicization and government intervention. While not mutually exclusive and often linked, they are not the same concept. In this thesis, I assume that the *sine qua non* condition to politicization is the manifestation of political salience. This is to say that market dynamics are diverted from their classical economic "natural balance" due to the interlinkage with political affairs. Politicization is a measure of a government's (or another ruling political entity) propensity to intervene in a market being influenced by politics. That is, the political entity acts either because it believes its action will result in a political gain, or that a lack of action would result in a political loss. A simple illustration would be a government acting on an agricultural market to achieve food security, as a failure to do so could result in civil unrest or electoral defeat. Ultimately, when intervening in the market, the expected result (intermediary objective) of the intervention within the market is only a means to reach a goal (final objective) exogenous to the market. For example, *state A* applies an embargo on strategic goods against *state B*. The final objective would not be to harm *state B*'s export performances of these goods (this is the intermediary objective), but instead to have *state B* altering its political agenda due to the pressure of the intermediary objective.

Why, then, are government interventions and politicization different? Firstly, a government can take a role in a market despite a lack of political salience. In this case, the function of the government is understood as bureaucratic or technocratic. The welfare provided by public policies benefit entities endogenous to the market.

Secondly, politicization does not only materialise when governments intervene, but also when there is a potential for political gain for a political entity if it were to distort the market. A political party running for an election can politicize a market by promising to intervene in this market to attract votes. The resulting uncertainty around the potential intervention (depending on whether the party is elected, or whether they fulfil their promises) can trigger market reactions related to market participants' expectations. Politicization can thus create market distortions without actual public interventions.

One more detail will be useful in this chapter: the nature of the political salience. A distinction that will be useful is to distinguish between domestic or international political salience. This is to ask if the policy put in place by a government has for its final objective an effect on domestic politics (such as electoral gain, secured internal stability related to citizens' satisfaction, harming of a political rival etc.) or international politics (essentially the achievement of a foreign policy goal).

b. Forms of government interventions

Whether public bodies intervene in the market or not, the previous section articulated that it is the perceived likelihood for politically motivated intervention that is the measure of politicization. This section explains the tools that governments have at their disposal to intervene in agricultural markets. To understand these mechanisms, it is useful first to shortly define what governments primarily aim for when intervening. This is about determining what the intermediary objective is. Essentially, when governments set up agricultural and food policies or temporary interventions in agricultural markets, they often pursue one of these three main objectives: affecting the production and/or supply of an agricultural product, affecting its price, or enhancing farmers' revenues. The line between these categories can be blurry, as they tend to impact each other: higher prices trigger higher revenues, as well as send signals to plant more. More production in turn supresses prices. Governments can therefore intervene at different levels depending on whether they want those chain reactions. For example, they could artificially set high prices to enhance producers' revenue, and remove the extra supply resulting from the incentive, from the free market, to plant. However, they can also attempt to achieve revenue enhancement without manipulating market prices (through direct subsidies to farmers). This is the case when the government also needs to look after populations vulnerable to high food prices. Although we tend to think intuitively that governments mostly aim for increases in production, few reasons can push them to attempt a reduction. That can be to trigger a rise in prices or to reduce inputs consumption, such as fertilisers or water, for environmental reasons.

Here is a short non-exhaustive review of the commonly used policy instruments to achieve these objectives:

- Price setting and procurement: The government can set a reference price at which it purchases a crop from farmers and build stocks that it will later resell, domestically or internationally. If the government attempts to increase market prices, it can set a high reference price, forcing private traders competing for procurement to increase their offer.
- Buffer stock: The government can procure the crop from farmers without setting a reference price and build a buffer stock. The goal is to offset price fluctuations by withdrawing some supply from the market when there is a surplus pushing prices down. It can be reintroduce later when a shortage pushes prices up.
- Revenue insurance: If the government does not want to influence prices directly but instead only producers' revenue, it can set a reference price and, when the market price goes below this reference price, pay farmers the difference.
- Production/consumption subsidies: The government can provide every producer or consumer with financial aid to help them produce or consume. This can come in the form of direct cash payment, government credits and loans or tax cuts.
- Export/Import quotas or bans: The governments can control the amount of a crop leaving/entering the country by setting quotas or even impose bans. This allows control of the supply available domestically, and eventually affects domestic prices.
- Export/import tariffs: These are taxes that exporters/importers must pay when moving goods across borders. They act as disincentives against international trading by making the product less competitive in the destination country. It can result in more supply remaining in the origin country/less entering the destination country.
- International agreements: Governments can enter international agreements to organise global trade and attempt to influence prices by controlling supply and demand at the international level.

- Government to government trade: Finally, governments can engage in direct trading on the international market to, on the one hand, sell domestic production or stock excess, and on the other, compensate for domestic shortages of supply.

c. Effects of politicization on futures contracts

As this chapter aims at demonstrating that the form of high politicization affecting the rice market contributes to the failure of derivative finance for this grain, I will describe the extent to which it is a politically salient crop. This section serves to provide a theoretical background to the proposed link between politicization and financial development. Politicization, when it results in government interventions actively influencing prices, reduces the incentive to trade derivatives due to a reduction in volatility, and therefore risk. Politicization can also affect the propensity to speculate when it produces important political uncertainty. Later in this chapter, I will argue that rice is politicized to an extent and in a form that no other agricultural commodity is.

i. Reduction of volatility

Government intervention, when price manipulation is directly targeted as the intermediary goal of politicization, can reduce the day to day volatility of the market, or narrow the range of price risk. For instance, a government procuring a commodity significantly above market price artificially fixes the price, and there is no price risk left to hedge and speculate. Therefore, there is, no more need for a derivatives market. In a nutshell, there is no ability to trade risk if there is no risk to be traded. This dynamic is more of a problem for futures contracts than OTC contracts because of the fragile nature of futures contracts exposed in Chapter II. If volatility is disrupted, participation in the futures contract disappears as there is no risk for hedgers nor profit to be made for speculators. The politicization leaves time for the futures contract to die out in the process, and when free-floating prices are restored, the hedging instrument has disappeared. Even if the exchange decides to keep the contract listed until the end of the government intervention (those are often temporary as they are budgetarily difficult to maintain), the exchange needs to restart entirely the process of building up liquidity once the market is freed from political interference. OTC contracts do not have this issue because it is an agreement between two parties that does not require market liquidity. However, as I will explain in Chapter VII, OTC contracts are rarely used without the support of a terminal futures market, so the entire process of sophistication of the market structure is disrupted.

Even if prices are not fixed, their variation range can be constrained by certain policies such as the introduction price floors and ceilings, or a public offer of free minimum price insurance, as was the case with the American farm program mentioned in Chapter III. In this case, the use of futures contracts is not halted as there is still room for prices to move at different levels above the minimum insured price or between the price ceiling and floor. However, when governments' policies reduce the volatility, speculators are less inclined to get involved in the market as the prospects for profits are reduced. In addition, some physical market participants who are not completely risk-averse might consider that they can afford any of those movements and leave the price unlocked within the government boundaries. Governments providing price insurance act as competitors to futures markets, taking away a part of the hedging need for the farmers that are only concerned about severe falls in prices. Government interventions would always act as some impediment to hedging activity in the underlying commodity, but dependent on the extent of the price intervention, it is not an absolute impediment. Part of the argument in this chapter is that what has a major influence on the level of intervention is the level of politicization of the particular market.

ii. Production of political uncertainty

The reduction of volatility noted in the previous section is not always the prevalent result of the politicization of the market. The first reason is that, as I will show many times in this chapter, it is very frequent for agricultural policies to fail to achieve their expected goals when it comes to price stabilisation. Even when they do, the success in price risk reduction depends on which time frame and from which geographical location the actions of governments are observed.

In this subsection, I argue that the announcement of policies derived from politicization, the uncertainty about their success or failure, and their abandonment creates difficulties in reading the direction of the market and understand price risk. This can contract the liquidity as adopting effective futures strategies becomes more difficult, especially for speculators. Although political uncertainty can increase the incentive to hedge, commercials find themselves with a lack of speculators to trade with.

The effect of political uncertainty on equity finance has been extensively researched. Under a variety of circumstances, studies have demonstrated that political uncertainty has consistently caused higher levels of volatility in the value of financial assets, especially depressing stock prices. Pastor and Veronesi (2012) found that government policy changes trigger falls in stock prices. Savita and Ramesh (2015) show that political risk, which they define as the unforeseeable changes in public policy that affects investment values, is higher before elections and consequently increases return volatility and option prices. Chau, Deesomsak and Wang (2014) found an increase in the volatility of Islamic stock markets during the Arab Spring. This result was supported by Trabelsi Mnif (2017), who found that the Arab Spring caused temporary higher levels of financial volatility and more pronounced stock market cycles. Liu, Shu and Wei (2017) examined the effect of the Bo scandal[73] on stock prices in China and found that a mostly political case depressed stock prices.

Although these studies do not cover derivative finance, especially commodities, the behaviour of investors (in equity finance) and speculators (in commodity derivative finance) towards political risk is expected to be similar. However, those researchers only show that political uncertainty affects financial markets. By analysing volatility and prices, they do not explicitly tell us about the effect on liquidity or participation in those markets, and therefore on financial development. Investors selling their assets and leaving the market is potentially one reason explaining the fall in stock prices. Bearish trends on markets struck by political shocks can be interpreted as signs of disinvestment. However, it is also possible that investors simply revalue the stocks and buy them back at lower prices, potentially based on the revision of credit risk by Credit Rating Agencies. The rise in volatility suggests nervousness of the market on the revaluation of assets rather than withdrawal of investment that would trigger a unidirectional fall in prices. A study by Le and Zak (2006) takes us closer to understanding the effect of political risk on market participation. The authors look at the effect of political instability and policy uncertainty on capital flight in developing economies. They find that political risk does affect investors' asset allocation decisions and accelerates capital flight. Similarly, in their in-depth review of research in emerging

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[73] In 2012, Bo Xilai, a rising star of Chinese politics, member of the Politburo, and his wife, were accused of involvement in the murder of a British businessman with whom they allegedly shared financial ties.

markets finance, Bekaert and Harvey (2002) attest that political risk (which they consider more prominent in those emerging markets) is one of the factors discouraging foreign investment.

Much of the research I referred to examines political risk related to a country level political instability rather than the politicization of a specific market. They look at the risk of political shocks creating collateral damage to those markets. Those political shocks do often impact commodity markets in the same way they could impact stock markets. For instance, when Ozdemir et al. look at the effects of political factors upon oil market prices, they look at external shocks such as “the 9/11 terrorist attack, political turmoil in Venezuela and the Second Gulf War are the most important shocks of this period” (Ozdemir, Gokmenoglu, & Ekinci, 2013). However, they also mention price alterations caused by OPEC policies, which is a form of politicization of the market. Ultimately there are two different cases, one being political actors actively looking at controlling the market, the other being political issues making market participants re-evaluate market prices. This chapter is concerned with the former, but the two cases have two things in common. First, they introduce a political variable to the price formation, which is no longer based on the microeconomics of supply and demand. Second, they tend to boost volatility.

The question here is why political risk would deplete liquidity in commodity markets when volatility is a pre-requisite for financial development.[74] The reason is that political risk is difficult to forecast, even more so to model. *“I think political risk should be called political uncertainty”* Lamon Rutten told me. By using the Knightian distinction of what is quantifiable or not, he had just put in words the concern that many of my interviewees had expressed. This is that political risk is difficult to analyse correctly in a price risk model because of its randomness and qualitative nature. In contrast, a weather risk can, for instance, be expressed with historical numerical data and probabilities, looking at how a given increase in rainfall would increase production. It would also consider how the modified resulting supply would impact prices. In the case of a political event, even if the probability of such events could be roughly measured, it would be difficult to transpose that into an estimated price change. At least, it would require tremendous data analytics resources. It should be emphasised that even in

[74] See Chapter II

the absence of on-going major political action upon the physical market, futures market participants are concerned about the potential for unexpected political disruption. Unlike weather events such as rainfall above seasonal averages, which appear in the eye of market observer over time and smoothly affect prices, political decisions come individually and are difficult to forecast. *"The problem is not politics per se, the problem is unpredictable politics"* Lamon Rutten summarised further and in a few words explained a small but vital distinction. Although politics affects all markets, even very liquid ones, the role of politics in shaping prices is greater in some, and the degree of unpredictability also varies. The higher the political uncertainty, the more affected liquidity becomes. As I discuss further in this chapter, rice suffers disproportionately from problems of political uncertainty.

As mentioned above, forecasting the impact of political risk requires a tremendous amount of data. It implies computing qualitative past political events into reliable numerical data to form a model that would later be applied to an infinite number of 'black swan' events. Having the resources to carry such analysis can reduce uncertainty and increase calculable risk. However, these resources are usually very costly. This is where politicization impacts financial development: it affects the ability to trade risk of many market actors who have fewer resources to establish their futures strategy. In particular, speculators are often involved in many markets and aim at diversifying their portfolio in such a way that the balance between those markets will often be beneficial for them. To create such a portfolio, they prefer markets with risks that are simple to model. Therefore, extreme politicization of a commodity affects the ability of speculators to buy risk from hedgers because they cannot analyse the nature of this risk. From the hedger's perspective, the effects of the politicization can also create distortions in the basis: if the contract is of an international nature, since politicization often creates distortions between various national markets, it creates a great deal of basis risk. Therefore, if the hedger had not planned to participate in delivery of the contract but instead settle financially, the basis risk can discourage the hedger from participating in futures trading.

In addition, political uncertainty is not only the result of price policies failing to achieve their objectives. It depends on the time and place from which it is observed. While a policy in country A may stabilise prices over time in this country, the price in countries B and C will likely be impacted by the results in exporting or importing performances of country A. Also, in both country A, B and C, there is a risk related to the potential random end of the policy. Finally, the abandonment of the policy might have long-term impact on prices in all three countries. The reduction of price volatility in a certain place at a certain time, due to government intervention, thus does not necessarily correlate with the reduction of price risk in other sections of the market and in the long run. Price stability in one place and time often results in politically generated price risk in others.

d. Food markets are politically salient

Julius Nyerere, first president of Tanzania, was leading a country facing food shortages in 1980. During a speech, he declared "If I were told that Tanzania has no shoes, and the only place I could get them were South Africa, I would not order any. But if I were told that Tanzania has no food, and that I could not get it anywhere else except from South Africa, I would buy it" (Honey, 1980). Coming from a leader of the decolonisation movement, while South Africa was at the time under boycott for its apartheid regime, this statement hinted at the political salience of food. Unlike other goods – like clothing – food is so vital that it would take over any ideological and moral politics consideration. "Food shortages can lead to riots, revolution and wars" (Hoekman & Kostecki, 2009). Food is important not only because it feeds people, but also because in developing countries, it often represents a high proportion of the spending from people's income. Therefore, high food prices can be particularly harmful economically for vulnerable populations, even if they can still afford to purchase these goods. In the next section, I explain why rice is the most politicized of the food markets.

II) The highly political economy of the rice market

a. Reasons behind the politicization of rice and its manifestations

"You just never know when someone is going to change something that, again, has nothing to do with supply and demand. It has to do with politics, rice is obviously the most political crop grown". These words from a US rice trader fitted a prominent narrative in the rice industry. Although food markets have a natural propensity for politicization, rice is often argued to be by far the most politicized and this section explains why. This will later inform the degree to which the politicization of rice is a factor in the lack of financial development.

When the argument around the unique politicization of rice repeatedly came up in interviews, I asked myself whether that could be the result of interviewee's bias towards believing their case is different. However, whether it was farmers, traders, or exchange executives, many interviewees were involved in other agricultural markets. Even actors from other markets sometimes acknowledged that the politicization of rice was nothing like what they are exposed to. Equally, the literature often highlights this notion without necessarily detailing it further. The politicization of rice should thus be explained. The reason behind this is that East, Southeast and South Asian countries concentrate on rice all the political issues that can individually arise when it comes to food, and do so to a large scale. Rice farmers constitute a large majority of rural populations in those countries and the grain represents livelihoods for millions of families in Asia; it is a major issue related to mass poverty (Cororaton, 2006; Harun, 2017). Rice is also the staple food for billions of people (King, 1953). In developing countries of Asia, as well as some in the Middle East and Africa, rice is, therefore, a matter of food security. Therefore, two groups emerge: rice producers and consumers (often city dwellers), both of which are vulnerable groups that represent the masses. They have a large voting and protesting power. The issue is that the interests of these two groups are found in the same countries, and these interests are rarely reconcilable. Not only do consumers need enough rice, but they need it cheap (Harun, 2017). On the other hand, farmers rely upon high rice prices. This need for governments to balance the assurance of food security and raising farm incomes creates a polarisation of political affairs around rice and a high degree of instability.

Rice is also unique in that it is a socio-cultural crop. The first sign of the significance of rice in Asian societies is found in languages. In Thai, "food may be divided into two categories, *khaw* meaning 'rice', and *kab khaw* meaning, literally, 'with rice'. Food is either rice or something eaten with it" (King, 1953, p. 453). In Japanese, *gohan* (ご飯) means both rice and meal, as does *fàn* (飯) in Chinese. Bray (1983; 2016) argues that the agrarian, technological and social relationships constraints and evolutions resulting from rice-growing societies have shaped the history of Eastern nations, from medieval times to colonisation and the post-independence and green revolution era. Ohnuki-Tierney illustrates how rice has shaped Asian identities, using the case of Japan. She says that "among all rice-eating Asians, the symbolic/religious importance of rice is amply expressed in its ubiquitous presence in major festivals and rituals—

rice planting rituals, harvest rituals, weddings, etc." (Ohnuki-Tierney, 2004, p. 4). This importance of rice in rituals, the role of rice in traditional beliefs, and the meaning of rice as a symbol of prosperity and abundance have been studied by many anthropologists (Misra, 1966; Kato, 1988; Simana & Preisig, 2006; Hussin, 2008). Bray explains that in places where rice is the traditional staple, "people assume that eating rice, or growing rice, makes them who they are" (Bray F. , 2014). This leads one to suppose that not only does rice create greater political tensions than other crops would, but unlike others, it plays a part in identity politics, reinforcing the political salience.

The political salience of rice domestically also triggers its salience in international affairs. Many importing countries are concerned over the dependency towards other supplying countries and have, therefore, aimed at achieving self-sufficiency. Although the reasons for these policies are also rooted in identity politics and the ability to control consumer prices, avoiding rice being used for diplomatic leverage by exporting countries is key to understand the self-sufficiency agenda. Major Southeast Asian importing countries (Philippines, Indonesia and Malaysia) have failed to achieve long-term self-sufficiency in the post-WWII era, mostly because of population growth and the prominence of farming terraces due to these countries' topography (Goldman, 1975; Mears, 1984; Arshad, Alias, & Noh, 2011). Similarly, many Western African countries such as Nigeria, Benin and Senegal aim to achieve self-sufficiency (Ezedinma, 2005; Van Oort, 2015). While these countries have a strong competitive disadvantage and have little chance of achieving self-sufficiency, their efforts to achieve as much food sovereignty as possible when it comes to rice shows the strategic nature of the crop internationally.

In practical terms, the sensitivity of the crop pushes governments to respond very quickly to all sorts of market shocks. Soon after the beginning of the Covid-19 crisis, public authorities reacted by restricting exports to protect their local supply, and, therefore, their consumers. Cambodia suspended its paddy and white rice exports, exporters in Myanmar could no longer obtain export licences, and Vietnam suspended exports for a few days to review its stocks before only allowing specific export quotas. This mirrored the 2008 food crisis when all major exporters, with the exception of Thailand, banned export due to concern of a global short supply. These countries, who often promoted farmers' income, were quick to shift towards pro-consumer policies.

However, it does not take such extreme cases for governments to suddenly and regularly implement new market interventions. Even in the absence of major crises, every week on the rice markets, many government policies likely to affect prices are announced. This could be a public import tender coming from a Middle Eastern country, a food donation from Japan, the releasing of stocks through auctions in Thailand, government-to-government trade in Southeast Asia, rice distributions in India, international trade restrictions by a major player, or the modification of a subsidy programme in Asia or Africa. The rice market is characterised by the fact that, apart from a few exporting countries in the Western Hemisphere such as Uruguay, all countries that are heavily involved in producing and consuming rice experience government interventions. Later sections will show that in other markets, there are usually a few key players that are politicized, but rarely all of them. All governments of rice economies are very proactive in the market, constantly adjusting their policies to current realities of the international market, of the local industry or of the weather. This creates a high instability generated by politicization. Many of these policies are short-term and do not need to be approved by parliaments. With the multiplicity of potential governments intervening and the number of ways they can do so, the political risk becomes very random and unpredictable, driving potential speculators away from the market. In the next section, I will illustrate the extreme politicization of rice in more detail by using Thailand as an example.

b. Two decades of market politicization in Thailand:

In this section, I look at the case of Thailand to illustrate the politicization of the crop in major exporting countries. Thailand is a particularly important case for many reasons. Not only is it a comprehensive example of the issues of politics in rice that are common in Asia, but its politicization also impacts the world trade due to the prominence of Thailand in the global market. Since the 1980s, it has consistently been the world export leader, only surpassed by India in 2011. Thailand holds a considerable share of international exports. In 2018/19, approximately 21% of the rice traded on the world market originated from Thailand. This, along with the rigour of Thai rice grading and the relatively transparent data, led its higher quality grade, Thai White Rice 5% broken, to often be used as a reference on the world market. Therefore, when the Thai market faces political shocks, the whole world market faces these same shocks. In 1986, the Thai rice market was liberalised and the grain was freed from trade restrictions to flow abroad. However, since the turn of the 21st century, the rice market has experienced several political shocks generated by unstable politics and has been used as a political tool in the context of electoral races. This has been the source of much political uncertainty on the rice market. In this section, I examine the last two decades of the politicization of the crop in Thailand.

To understand the politicization of the Thai rice market in the 21st century, I need first to go back to the 1980s and the root of the policy that would become, twenty years later, the instrument of politicization. Following their independence in the post-WWII era, many countries adopted policies of subsidising consumption to achieve food security, protecting vulnerable populations from malnutrition but doing so at the expense of farmers' welfare. Domestic prices were set below international prices, discouraging exports (Laiprakobsup, 2014). At the turn of the 1980s, Thailand was a fast-growing economy; its city dwellers were starting to form a middle class less sensitive to the price of rice as they became richer and diversified their food basket. This sent a signal to the government to shift to a pro-farmer set of policies (Shigetomi, 2011; Laiprakobsup, 2014). In the early 1980s, the government introduced a "paddy pledging scheme", organised by the Bank for Agriculture and Agricultural Cooperatives (BAAC), that aimed at giving farmers flexibility to delay selling their crop. The BAAC offered short-term loans to farmers who used their paddy as collateral. The loan size was calculated according to the quantity of rice pledged by the farmer and the price predetermined by the government (the pledging price). After five months, they could either redeem the loan or forfeit the collateral paddy (Kajisa & Akiyama, 2005; Shigetomi, 2011; Chulaphan, Chen, Jatuporn, & Jierwiriyapant, 2012; Poapongsakorn, 2012; Laiprakobsup, 2014). The second option was rarely used as the pledging price was set below the target price (paddy price at harvest). Farmers mostly used the loan to gain storage flexibility to exploit the price seasonality[75]. Thus, the scheme did not aim to influence the market price. At the time, only a small share of Thai farmers entered the scheme. In the late 1990s, the amount of paddy pledged only represented around 3% of the total production. The market thus faced a low degree of government intervention at the time, with policies formulated by technocrats

[75] Due to the inflow of rice available soon after harvest, prices usually reach a low at this time of the year. Therefore, farmers would ideally store rice for a few months and sell when price picks up.

that lasted in the long run. Without distorted rice prices or changing policies, there were no major obstacles to potential financial development of Thai rice over these two decades. In fact, in Chapter VII, I do not attribute the failure of the 1990s London Fox contract over Thai rice to politicization but to exchange mismanagement. However, these times of liberalisation do not mean that the crop was not already politically salient but rather that it was not yet exploited. The subsidising of consumers before this period showed that there was an awareness in the government of the importance of feeding urban populations. However, there was not yet the realisation of the unexploited electoral power within the farming population, which left the market free floating for two decades.

Things changes in the early 2000s. Following the 1997 Asian Financial Crisis, a telecommunications tycoon, Thaksin Shinawatra, created his political party, the TRT, in a bid to run for Prime Minister in 2001. His agenda was to free businessmen of the prevalent bureaucratic burden (Phongpaichit & Baker, 2008). However, the TRT understood that the business community's support was not enough to win an election. The party intended to gain votes from the poorest rural populations. Thaksin soon inherited the label of a populist leader that observers never expected him to become (Phongpaichit & Baker, 2008). Throughout the campaign and subsequently after winning the election and entering office, he proposed and enforced all sorts of policies aimed at consolidating his support from farmers. Estimations from 2010 suggest that as many as 17 million people are engaged in rice farming activities, representing "a quarter of the country's entire population, which makes rice farmers the largest voting bloc in the society" (Sriyakul & Jermsittiparsert, 2017, p. 20). The most important of all TRT's policies was the transformation of the rice pledging scheme. The pledging price, historically set around 80% of the target price, was raised to 100% in 2001. The soft loan programme had suddenly become a "'de facto price support' program" (Poapongsakorn, 2012, p. 194). That year, participation in the program jumped to 22% (Shigetomi, 2011).

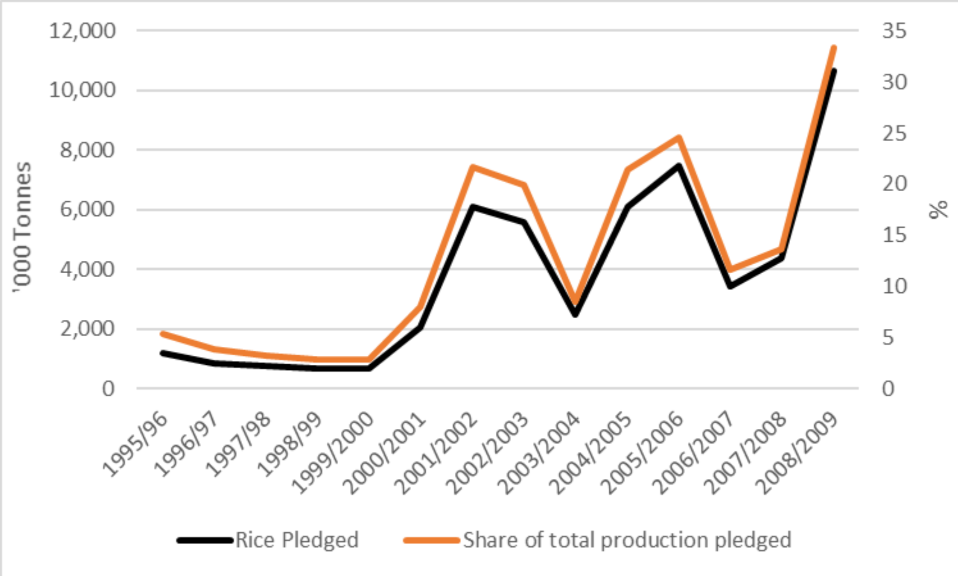

Figure 12: Volume and share of paddy pledged (Data adapted from Shigetomi, 2011)

The opportunity of selling rice to the government at a set price created a virtual price floor, as mills and traders had to buy the rice at a similar price to be competitive. This, on the one hand, smoothed farm price movements. On the other, as more farmers forfeited their rice, the government was forced to build stocks. The times when it would randomly decide to release these stocks were prone to trigger downward price shocks (Poapongsakorn, 2012). The market had artificially turned into a mostly smooth one prone to sudden price drops. A contract for rice at the time would only have served exporters but would have struggled to attract speculators because of the reduced daily volatility and the unforecastable political risk.

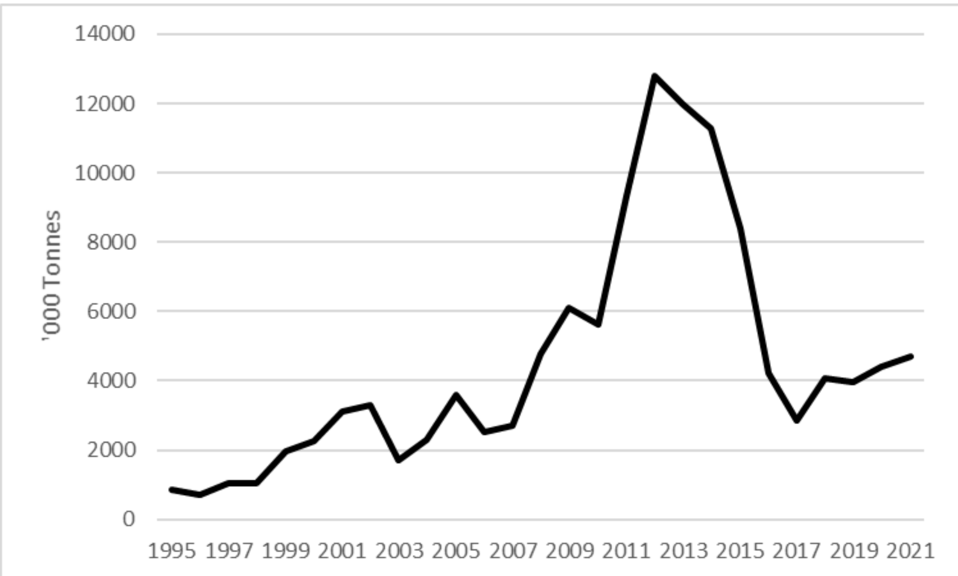

Figure 13: End of the year stocks of rice in Thailand (Data from USDA)

However, it was also the dawn of two decades of unstable rice politics. Shortly after Thaksin's election, Thai democracy evolved towards a strong political polarisation. The scheme was very costly as all the public money spent by the government for procurement at pledging price, transport, milling and storing would have to be financed by taxpayers. This alienated the urban middle and upper-middle class that carried most of the fiscal burden. Although the price of rice on the shelf had not significantly increased, they were indirectly paying a much higher price for it, regardless of their consumption. An anti-Thaksin group was formed in 2001, the "Yellow Shirts" (the colour of the monarchy), whose protests were answered by the emergence of the rural pro-Thaksin "Red Shirts". Thailand was caught in a dynamic where the government answered the vocal protests of the opposition by increasing populist policies to reinforce its support base, strengthening further the opposition's sentiment. This is illustrated by the particularly high pledging price of 2002 and early 2006 (see Figure 14), which were a response to the Yellow Shirts' massive demonstrations (Shigetomi, 2011). The social tensions culminated in the sudden army coup of September 2006 to prevent a faceoff between the Yellow and Red Shirts in the heart of Bangkok. Military coups are common in Thailand and whether this one was legitimate and intended for the end of a political deadlock, unsustainable populist policies and anti-democratic behaviour by the TRT, or simply a royalist-motivated action in favour of the urban groups, is still subject to discussion (Phongpaichit & Baker, 2008; Charoensin-o-larn, 2009; Bunbongkarn, 2015). The coup led to an abrupt and unexpected end to Thaksin's policies, thus illustrating the extent to which this crop can be politicized (Charoensin-o-larn, 2009).

The administrative government that succeeded him reverted to the late 20th century policies with a pledging price slightly below market price, leaving more room for volatility. Immediately, participation in the scheme fell by more than half (Shigetomi, 2011; Poapongsakorn, 2012). Despite this reversal being another unexpected political shock, it left the market in a state more conducive to financial development. It was not a coincidence that the first AFET rice contract was launched in March 2007. It failed to attract liquidity, although for other reasons related to the lack of willing sophisticated actors, as discussed in Chapter VI. Participants of the Thai rice market interviewed offered a variety of reason why they did not take part in that futures market, but politicization was not one as the situation had improved in that respect. However, they had not expected that Thaksin's policies were not a onetime event.

Even with their former leader in exile abroad, the People's Power Party (which replaced the TRT) won the new elections in late 2007 and high pledging prices were reintroduced. They were even maintained during the 2008 food crisis when Thailand was the only major Asian exporter not to oppose exports. Despite the farm price doubling within three months, the government still estimated that a high pledging price was legitimate, moving it from 7,000 to 14,000-baht (Poapongsakorn, 2012; Laiprakobsup, 2014). Despite target prices falling back to 9,000 baht for the wet season of late 2008, the government tried to maintain the pledging price at 14,000 baht, before compromising at 12,000 bahts amid concerns about the fiscal costs of the scheme (Poapongsakorn, 2012). Such indecision about the value of the pledging price illustrates further the politicization of the crop. The government artificially set the price in a way that was hardly forecastable with the sole objective of solidifying its political base. This unpredictability was of nature to keep speculators away from the AFET, where the very few commercials were deprived of trading counterparts.

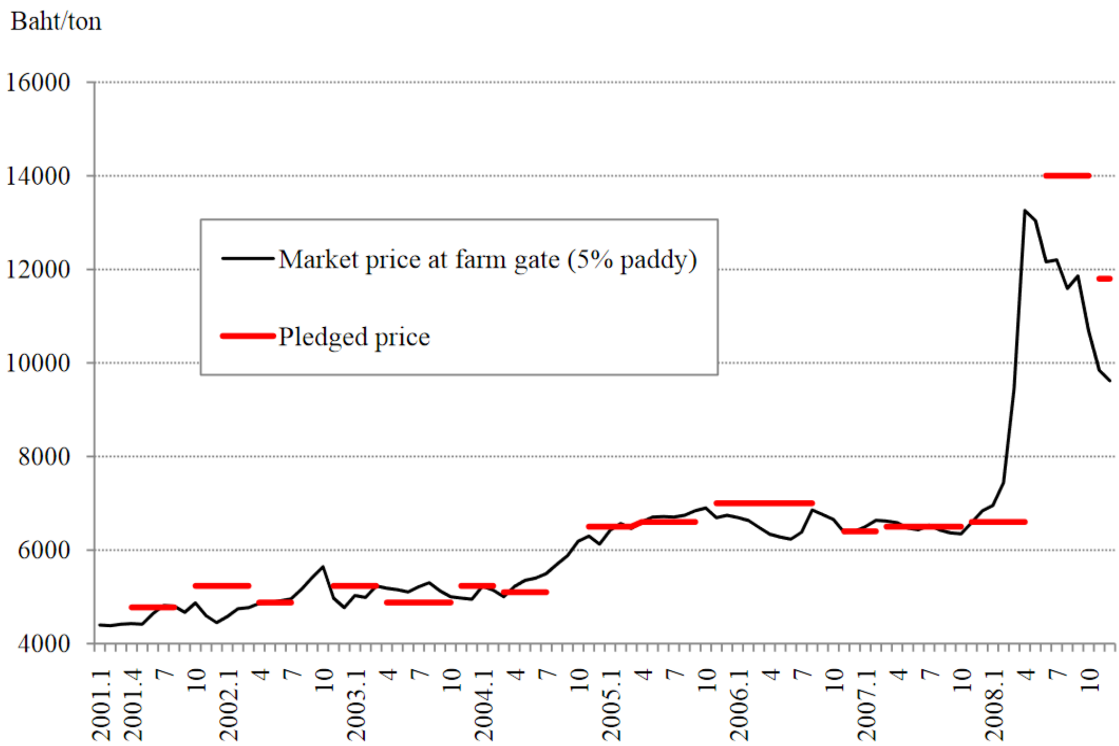

Figure 14: Market price of rice vs. Pledging price (by Shitgetomi, 2011)

In late 2008, the People's Power Party was dissolved because of election fraud. A Democrat government was subsequently formed. It needed to reform the rice policies to favour its urban support base while not harming farmers in the hope to disrupt futures populist campaign. The pledging scheme was abandoned in 2009 and replaced by an income guarantee programme instead. This was similar to the US farm program discussed in Chapter III, with farmers "receiving a subsidy equivalent to the gap between the market price and the governmentally guaranteed price in the case the former falls below the latter" (Shigetomi, 2011, p. 90). The government kept farmer protection while attempting to return the market closer to its demand and supply mechanisms, and relieve the taxpayers from the pledging scheme's logistical cost.

Such policies were not effective in preventing Yingluck Shinawatra, Thaksin's sister, and her Pheu Thai Party (PTP) to win the general election in 2011. She campaigned over the reestablishment of the pledging scheme at a price 50% above the market (Chareonwongsak, 2015). In effect, it was not a pledging scheme anymore as the rice did not serve as a collateral, it was a procurement system. Farmers delivered their rice at their local mill in exchange of a warehouse receipt allowing them to claim the funds from the BAAC (Sawasdipakdi, 2014). The government hoped to build stocks while depleting exports so that the price of Thai rice would increase on the global market and intended to release these stocks at a profit later on. This never happened as India and Vietnam increased their exports and filled the space left by Thailand. The government thus had to carry the burden of rice it could not sell. In the long run, it created a surplus of rice, depressing prices globally (Permani & Vanzetti, 2014). Even if it failed, the government explicitly intended to manipulate the domestic and international markets, reinforcing the perception of the market as a politicized one where trading derivatives would be more harmful than beneficial.

When a Pan-ASEAN futures contract based in Singapore was discussed by an expert meeting group in 2012, the Thai situation was in the minds of all participants. Politicization would always have been an issue raised but it was overly prominent in both the meeting discussions and the research and position papers published ahead of the meeting (Pochara, 2012; McKenzie A. , 2012; Hamilton, 2012). In the interviews he conducted in 2011 to prepare the meeting, McKenzie found that both Thai exporters and international trading houses believed that the Pheu Thai Party's policies were an obstacle both to the second AFET rice contract launched that year and a regional futures contract in Singapore. The uncertainty coming from Thailand, which had been the reference of liberalised rice trade for twenty years, made stakeholders doubt about how any financial development of rice could last through time.

Back in Thailand, the PTP ended up losing all support. Prices were so high that urban populations were harmed not only as taxpayers but also as rice consumers. The anger also grew within the rice industry, who worried about the reputation of Thai rice being harmed (Poramacom, 2014; Bunbongkarn, 2015). The scheme soon started harming farmers too, as the government could no longer pay them on time due to a large budget deficit. Banks started to refuse lending money to the government as the system seemed unviable (Sawasdipakdi, 2014; Bunbongkarn, 2015). In total, the scheme may have cost as much as $16bn. The government had gone further than choosing between farmers and consumers, as nobody in Thailand was financially able to pay for the scheme. The PTP was overthrown by a new coup in May 2014 and replaced in power by a military junta.

The effects of Yingluck's scheme did not stop in May 2014. For years, the successor military government attempted to sell the stock through auctions. The release of the old crop, which suppressed prices at irregular time intervals, was an effect of politicization since the stock itself had been built for highly salient political reasons. Besides, the junta did not put an end to market intervention. In September 2017 for example, it approved a $2.2 loan scheme to stabilise rice prices in an effort to secure popularity in the rural regions loyal to Thaksin ahead of new democratic elections (Ratchathani, 2018). The Shinawatra family's populist policies have entrapped all political forces into the politicization of the crop.

Thailand illustrates how far the political salience of a crop can penetrate its market. As politicians seek votes from farmers to seize power and stay in office, intervening in the market becomes a priority. The effect of the politicization of Thai rice on financial development mirrors directly the effects theorised earlier in this chapter. On the one hand, the pledging scheme in Thailand has artificially set prices way above the market price on many occasions, taking away much of the underlying price risk. On the other hand, political uncertainty ahead of democratic elections, or political shocks triggered by military coups, make forecasting the Thai rice market particularly complex. Because of Thailand's position in the world market, it has often been proposed that a futures contract covering Thai rice 5% would be a good place to initiate financial development (I discuss this in Chapter VI and VII). If this hypothesis seemed legitimate in the 1990s, the promise of a stable political environment seemed to have faded in the 21st century. However, the issue goes further than simply the financial development of Thai rice, whether domestically or internationally. The politicization of Thai rice tends to affect the pricing of other important origins. For instance, several studies show the bi-directional price transmission between Thailand and Vietnam (Ghoshray, 2008; John, 2014; Sirikanchanarak, Liu, Sriboonchitta, & Xie, 2016). In particular, Sirikanchanarak, Liu, Sriboonchitta & Xie (2016) show that price shocks are transmitted between the two markets, and that the impact of a shock in Thailand will impact the Vietnamese market for seven months. They also show that periods of distortive policies applied in Thailand increases the co-integration of the two markets. This illustrates how the politicization of one origin – in a market where few countries hold large export shares – can affect prices globally and therefore spread the inhibiting effect of politicization on financial development (Jha, Kubo, & Ramaswami, 2016).

The case of Thailand outlines how the market does not fulfil the criteria of prices freely determined. However, it is unclear whether politicization is specific of the rice market. The rest of this chapter investigates whether my compared crops are politicized and, if so, whether the politicization affected financial development. This will allow for the validating of the hypothesis for rice.

III) Politicization in other commodity markets

If politicization impeded the financial development of the rice market, it would suggest that the politicization of other crops that are financially developed is minimal. This is not the case. Agricultural markets that have high levels of financial development have not achieved this in the absence of politicization. I argue that it is the form of politicization and the market structure itself that determines the impact of politicization on financial development. This section explores the mechanisms of politicization of my compared crops. Wheat and coffee are discussed together as they have similar models of politicization. These markets are not currently very politicized. Yet, through history, they financially developed in contexts of politicization. However, the public interventions in those markets often failed, limiting the impact of politicization. Sugar differs as it is still a very politicized market in most countries, characterised by government interventions. Yet, those are often rather forecastable and take place at the national level, having only a secondary impact on the international market.

a. Wheat and coffee.

This sub-section presents the similarities and differences of wheat and coffee that lead politicization to have had only a limited impact on their financial development. I find that the peculiar nature of politicization in these markets does not invalidate the hypothesis that politicization might negatively affect the financial development of rice. The wheat and coffee markets are characterised by little government intervention due to their limited political salience. I argue that while coffee is almost unpoliticized (or depoliticized, as I argue based on its history), wheat faces a little more politicization, but in a way that is manageable in terms of uncertainty for market participants. However, throughout history, different transnational policies have been put in place, but their lack of success has prevented government interventions from impacting financial development.

Before rewinding history, it is useful to describe the present state of both markets' politicization. In a subsequent paragraph, I will justify these levels of politicization. Nowadays, on the coffee market, government involvement is restricted to the minimum. A coffee market analyst[76] explained: *"Since 1989, no policy to my mind has really impacted coffee. There are some regulations with regard to fumigations, there are some taxes for import and export, but all of this is extremely minor".* The market very much follows a logic of free trade. Only a few African countries apply some export taxes but, according to my interviewee, nothing impacting the global market. Brazil also applies an income support programme in case of prices falling below cost but only, due to the budgetary cost, to a minimal extent (Teixeira, 2019). In addition, the negotiations between farmers groups and the government are usually slow and transparent, therefore not creating price shocks. This absence of politicization means that financial development is not obstructed nowadays. Instead, coffee market analysis is driven by an analysis of available supply, mostly based on weather conditions. Draughts in Vietnam or frosts in Brazil are the main driver of a market

[76] Interview with an anonymous coffee and sugar market analyst, Switzerland, April 2018.

where consumption increases steadily and is easily correlated to macroeconomic conditions in major consuming countries.

The situation is somewhat less clear for wheat. Every time I asked my interviewees about political risk, politicization or government intervention on the wheat market, the answer was significantly different. A few response patterns still appeared: analysts and traders only involved in wheat think of their market as very politicized, while participants of multiple markets understand the wheat trade as relatively free from political salience.

In practice, one geographical region is the source of most of the significant political event affecting the wheat market: the Black Sea region. In other areas of the world, government interventions are marginal and global trade in wheat is mostly liberalised. Since the beginning of the 21st century, the centre of the world wheat market has shifted from North America to the Black Sea, with Ukraine and Russia collectively overtaking Canada and the US as the leading exporters globally. The heart of the wheat market is now in a politically less stable region, with two governments that practice the imposition of export restrictions to control the market for a variety of more or less salient political reasons (Sedik, 2017). For instance, the Russian government responded to the 2010 heatwaves and wildfires destruction of large shares of the crop by banning exports. Although that decision damaged the reputation of Russia as a wheat exporter, triggering anger within the industry, Vladimir Putin had other political aims in mind (Belton, Farchy, & Blas, 2010). The then Prime Minister aimed at deflecting criticism with grand gestures and addressed the population's resentment towards the management of the crisis with a pro consumer policy, protecting the population from a rising crisis (Kramer, 2010; Belton, Farchy, & Blas, 2010; Welton, 2011). However, seeing prices rising internationally as a result of the loss in supply, Russian producers decided to store the grain and wait for the embargo to be lifted, making the policy inefficient domestically (Welton, 2011).[77]

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[77] Other events contributed to some interviewees portraying the region as politically risky, although these are not results of the crop's political salience, but rather shocks in international affairs affecting the wheat market. In particular, the 2014 conflict between Russia and Ukraine created uncertainty upon the future of the Port of Mariupol (the main port for Ukrainian wheat exports) and the ability of Russia to export amid the EU and US retaliating sanctions (Buckley, 2017). This destabilised the futures market for a time, as illustrated by the 4.5% increase in US wheat futures in a single day ahead of the invasion of Crimea (Lynch, 2014).

Sedik (2017) argues that the control of those governments over the market is only growing as they not only regulate the market but also take control of parts of the supply chain such as grain storage, transport and export facilities. However, market actors I interviewed often minimised the criticality of the political risk. A Switzerland-based broker[78] told me confidently that *"those political interventions in Ukraine and Russia, we are used to them by now, we know how to react"*. Swithun Still[79], a Switzerland based trader specialised in the region, went further, saying he believed those risks were not even so prominent: *"Governments decisions such as the 2010 export ban are extremely unlikely to repeat, because they know it was a mistake. I don't think there is any significant political risk from that perspective. There is inevitably some risk that some restrictions will be put on exports if they had a bad crop. And they might be official or unofficial restrictions, but I don't think they are significant enough."* Whether they are correct or not, these perceptions partly explain the Chicago wheat contract and the newly established Black Sea Wheat contract remaining successful despite the level of political risk (I discuss these contracts in Chapter VII).

Two other factors limit the effect of this politicization on financial development: concentration and diversification. The concentration of political risk in the Black Sea only simplifies its integration as black swan events in risk models. Such ability to integrate political risk is not possible in rice where it affects most key countries of the market, and where the frequency of political events is too high to be approached as black swan events. On the other hand, the many origins and destination in the international market allows for the compensation for shocks in one country, on a short notice. Russia and Ukraine do not own shares in the international wheat market comparable to the domination of India and Thailand in rice. Swithun Still argued that *"there are enough origins to make up for the shortfalls if something happens in an origin, they will go buy elsewhere".*

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[78] Interview with an anonymous European swaps and futures broker, Switzerland, November 2018.
[79] Interview with Swithun Still, Black Sea Grain Trader, Switzerland, April 2018.

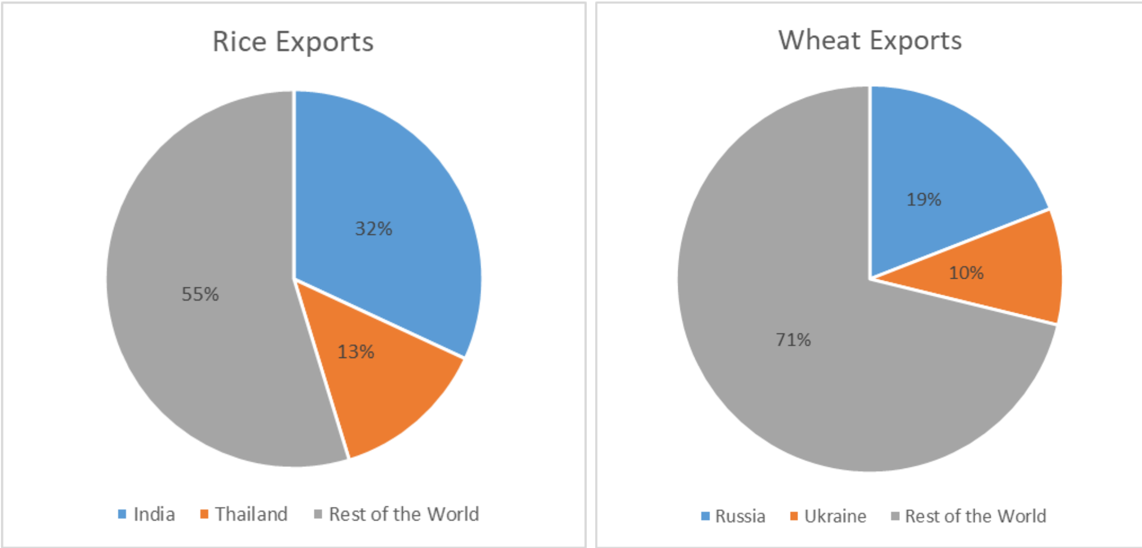

Figure 15: Percentage of exported volumes in the rice and wheat world markets, 2018-2020 (Data from USDA)

The geographical distribution of production and consumption plays an important role in the limited political salience of coffee and wheat. Coffee is a luxury product, making it consumed mostly in developed countries, while being produced in developing countries. This geographical bi-polarisation of the coffee chain implies that, unlike rice, there is no political salience born out of conflicting interest groups (producers and consumers) within the same country. In importing countries, consumers' revenue is high enough for the variations in coffee prices to be unimpactful. This is also reinforced by the small share of the price of a coffee cup sold in a shop that actually reflects the price of the coffee itself (around 10%). In wheat, apart from the Black Sea, policies to stabilise prices tend to be stable and undisputed, due to the low political salience: many of the biggest exporters in the world,[80] which generate price formation, are countries where the level of wealth undermines the food security argument from a price perspective. Both wheat and coffee consequently escape the farmer vs consumer debate that triggers policy instability in rice. In addition, although in some countries producers and processors' lobby groups hold some political leverage, these are rarely comparable to the electoral force represented by rice farmers. Coffee farmers usually represent a small portion of the rural workers in developing countries. Wheat farmers are even fewer in the rural areas of developed countries. As a result, unlike rice, these markets are not as politically salient, making them less of a key

[80] Russia, Canada, the US, France, Australia and Argentina are the largest exporters.

aspect of national politics than rice. When farmer subsidy programmes are enforced, it is often more technocratic than politically motivated.

Despite their low politicization at the national level, coffee and wheat have not developed financially without playing a role in international politics. During most of the twentieth century – periods during which the main futures market for both crops grew significantly – both markets have been the objects of various international trading agreements that had the stabilisation of production or prices as the intermediary objective, to ultimately serve a final political goal.

Coffee agreements emerged following the failure of public interventions in early 20th century Brazil. For three decades, various policies were established to support the revenues of rich planters, who were often members of the congress of their state or held great economic power (coffee represented most of Brazil's exports), held "political hegemony" in Brazil at the time (Font, 1987). None of the policies implemented – planting ban, buffer stock, export restriction – achieved the expected effect on price and it appeared that international agreements were needed in coffee to control prices (Hutchinson, 1909; Daviron & Ponte, 2005). Therefore, most of the 20th century was dominated by international agreements – the Inter-American Coffee Agreement in the 1940s and the International Coffee Agreement post WWII – setting in place trading quotas and and price control (Daniels, 1941; Pelaez, 1973; Pendergrast, 1999; Daviron & Ponte, 2005). However, in a market with many exporters, a cartel could not be built and the functionning of these agreements were conditioned to the participation of large importers – the USA and later Western European countries – despite the disadvantageous terms of agreement for them. For these countries, coffee was only a means to achieve diplomatic goals. As for a lot of developing countries at the time, coffee was the main exported product and their largest source of foreign currency. For these developed countries, supporting the coffee industry helped prevent the developing countries from joining the Axis power during WWII and the communist bloc afterwards (Pelaez, 1973; Haight, 2017). Thus, the politicization of the coffee was high at the time, but the end of the cold war signalled the end of the need to achieve this secondary objective[81] and it ended the political intervention in coffee, resulting in the liberalisation of the industry.

In wheat, the academic literature does not attribute diplomatic ambitions to the multiple renewals of the International Wheat Agreements (IWA) concluded between the 1930s and the 1970s. Instead, some authors suggest that the intermediary goals of stabilising farmers' income and building up supply to feed vulnerable consumers were more often motivated by domestic political considerations (Golay, 1950; Kristjanson, 1951; Farnsworth, 1956; O'Connor, 1982). Although wheat farmers do not hold the voting shares of their rice counterpartrs, in some countries, such as the US, farm lobbies hold a significant power to trigger policies favouring the achievement of such goals, through campaign funding contributions for instance (Hansen, 1991). However, the lack of efforts from most countries in implementing the mechanisms of the IWAs suggest a low political salience of wheat at the time. This political salience only increased towards the end of the cold war where the dynamics of the wheat market revolved around the American-Soviet relations. In 1972, the US awarded USSR with a $750 million credit over three years to purchase US wheat as a diplomatic tool to materialise détente. This cooperation between the two super powers was disrupted at the end of the decade when the Soviets invaded Afghanistan. The US retaliated with the announcement of an embargo on grain exports to the USSR. The supply cut-off aimed at forcing the USSR to withdraw from Afghanistan and prevent any further invasion of Pakistan and Iran. Therefore, wheat was a diplomatic tool to the same extent that coffee could be.

As explained earlier in this chapter, two questions should be asked when examining the impact of politicization in relation to derivatives trading: does it removes the need for hedging and does it creates risk that is particularly difficult to forecast? The answer for both questions is generally no. Both the ICA and the IWA, as well as their predecessors, faced difficulties with putting mechanisms into practice and as a result, with impacting prices. These agreements were never successful in suppressing volatility in such a way that risk trading would have been no longer necessary. The IWA was never successful due to various technical issues making the enforcement of

[81] In addition, the economic development of some exporters such as Brazil and the diversification of their export meant that coffee lost its economic leverage in international politics.

quotas impossible. It goes beyond the scope of this thesis to detail these issues, but they resulted in prices remaining generally unaffected by politicization. After the failure of previous coffee agreements due to their failure at including all significant producers and consumers, the ICA was eventually successful in keeping prices within a range. Yet, the market was free to float within it, therefore justifying the use of derivative contracts by any income maximising individual. The events around the American-Soviet relations in wheat eventually impacted prices but these were one-time events. The fact that market analyst interviewed in the US still mostly refer to these when talking about politicization illustrate the rarity of such occurrences. Therefore, the politicization that accompanied the financial development of coffee and wheat in the 20th century created little price risk. The main uncertainty was around the introduction of trading agreements, regarding the extent of their effectiveness. However, these were signed following long negotiations, allowing market observers to comprehend their ability to control the market ahead of their introduction. Once they were in place, the policies remained stable until their next scheduled renegotiations.

We can conclude of these two cases that politicization, even under great political salience, does not always materialise into greater uncertainty, nor does it effectively suppress volatility. Thus, the practicalities of the policies resulting from politicization are key factors in the potential suppressing effect of politicization on financial development.

b. Sugar

Sugar is commonly described as the most politicized exchange-traded commodity. I discuss it separately from coffee and wheat because the processes and effects of politicization are fundamentally different between these commodities. This subsection exposes how sugar is a heavily politicized commodity that manages to maintain a futures market. I first briefly expose what sort of political distortions animate the sugar market. I follow up by pointing at the politically salient issue behind these distortions. Finally, I explain why financial development happens despite this politicization. I argue that the large remaining international market where sugar is traded freely makes futures contracts a valuable hedging mechanism. Financial development has found its place in areas of the market were politicization has less impact on price formation.

Furthermore, the long-term nature of sugar programmes avoids adding issues of political risk to the market.

Sugar, like wheat and coffee, had international agreements (the International Sugar Agreement, ISA) in the few decades before and after WWII. Unlike other crops, this agreement did not aim to stabilise volatile prices resulting from the free market, but instead reconcile conflicting national sugar policies that collectively increased risk in global price formations (Swerling, 1954). Ultimately, these agreements have been unsuccessful at achieving their objective, and are often considered simply failed attempts that were not given enough power to achieved price stabilisation or suppression (Swerling, 1954; Mahler, 1984; Marks & Maskus, 1993). However, this highlights the main feature of the sugar market: powerful domestic policies and a liberalised international market characterised by volatility. Just like in rice, almost all countries – whether net importers or exporters – involved in the global market have their sugar programme. The goal of this section is not to describe in detail what these policies look like individually, although a few examples will be provided.

India, a case often referred to by interviewees and the third-largest exporter of sugar, has a very interventionist policy covering sugar. The government fixes a minimum cane to which the states can add individually. This minimum price is fixed very high and millers are expected to accept every stick of cane offered to them at this price. The Indian sugar industry consequently produces a large surplus resulting in large stocks. The government attempts to liquidate those through export subsidies. Until very recently, Thailand, the second-largest exporter, used a quota system (detailed in Chapter VI). Through this system, the government distributed the production between the domestic and foreign markets, set a minimum price and set in place a revenue-sharing system between farmers and millers. The EU similarly used a quota system from 1968 until 2017. The mechanisms of this system were very complex (and modified in 1992 and 2006) and beyond the scope of this thesis. However, to present it simply, the quota included a level of production for the domestic market that was bought from producers at a high minimum price. The surplus within this quota was offered export subsidies, while any sugar produced outside of this quota was exported at the world price. The EU also imposed custom duties on import. The three countries already discussed had (or will have) to transform and soften their interventionism in the market due to cases brought against them by Brazil (the world largest producer and exporter of sugar) at the WTO. Brazil considers that they have breached international rules on maximum subsidies. Indeed, the Brazilian government does not provide such support programmes to its producers, allowing it to claim unfair competition from its rivals. However, it intervenes in the market through a very different mechanism: the setting of oil and ethanol prices. As ethanol serves as an alternative outlet for cane than sugar, Brazil can virtually set the price of cane when calibrating its energy policies.

The above is not an exhaustive list (for example, it does not include domestic US or Chinese policies), but describing every single of them would be superfluous. What matters is undertanding why there is so much political intervention in this crop. Marks and Maskus set the record straight: sugar "has no real strategic importance" as a commodity (Marks & Maskus, 1993, p. 2). Unlike rice, it is not vital to feed a nation, and despite the growing importance of ethanol, cane does not have the importance of oil or coal in most nation's energy mix. The reasons for politicization are not the same in developed and developing countries. Borrell and Duncan explain that the "aims of sugar policies in industrial countries are usually the stability and maintenance of farm incomes" (Borrell & Duncan, 1993, p. 16). However, that does not explain how the sugar industry has gained enough importance to justify public spending to support production. The explanation is historical. Since the 19th century and the emergence of sugar beet production in Europe, sugar became a rare commodity to be produced in both the North and South, forcing industrialised countries to protect their markets against more competitive producing regions, whether they were colonies or newly independent nations (Mahler, 1984; Marks & Maskus, 1993). These public support programmes have thus been in place for more than a century and carried on because of historical heritage. The sugar industries of Europe, the USA, Canada and Japan have been built upon these public schemes and abandoning them would now certainly mean the abandonment of the domestic industry. In developing countries, politicization finds reason closer to rice or coffee. Firstly, the number of votes that represent sugar grower is significant in countries with democratic elections like India and Thailand. *"In India, I think there are 35M cane farmers. 50M altogether people whose jobs are directly in sugar. That is a lot of votes",* a sugar analyst[82] said. In Thailand, there were

[82] Interview with Julian Price, sugar trade analyst at julianprice.com, London, UK, September 2019.

already 1M farmers involved in growing the crop in the 1990s (Doner & Ramsay, 2004), Although that represent a large pool of potential voters, it is low compared to the 16M rice farmers (Blake & Suwannakij, 2016). However, cane farmers are exceptionally well organised as a political group compared to other farmers (Ramsay, 1987; Doner & Ramsay, 2004). This could be due to the existence of larger farms (rare in other crops), around which interest groups can originally form, and their concentration in restricted geographical areas, facilitating collaboration (Ramsay, 1987). Boosting sugar exports has also been of interest for developing countries in order to earn foreign exchange (Marks & Maskus, 1993; Doner & Ramsay, 2004). Hewison also proposed an additional reason why the Thai government had initiated the revenue sharing system in the 1970s. He believes that one aim was to contain the progression of capitalism and its impacts in the Thai countryside, which the government understood as a threat to social and economic stability (Hewison, 1986). What should be noted through this analysis is that sugar's politicization differs from rice in the sense that most political interventions are made in the interest of producers.

The unidirectionality of policies is key to solving the topic of this section. I have shown that there were market distortions produced by the political salience of the crop. However, I must explain why financial development still takes place despite politicization. The governmental changes in market control are rare and often happen when previous schemes expire, making the scheduling of political events rather clear (Borrell & Duncan, 1993). This fundamentally differs from rice. The fact that there is no tension between protecting both producers and consumers is key in the ability to maintain these policies, in sugar, in the long term. As a result of quota systems, price formation is made complex for international trade, but the volumes traded are often forecastable based on production. They may not be traded at one single price (depending on which quota it falls into), even internationally, but sugar market experts can still forecast market trends. In addition, once the sugar passes through the quota system and is imported and exported, free-market laws apply. Therefore, there is an international market where traders need to be able to hedge price risk. Interviewees confirmed that all the major sugar trading houses – such as ED&F Man, Wilmar and Louis Dreyfus– are heavily involved in the futures market, whether for only hedging or also taking physical delivery. Sucden even has a subsidiary called Sucden Financial to trade derivatives. Thus, politicization of the sugar market offers little room for financial development at the local level, but does not prevent it at the international level.

The question remains whether the sugar contracts would be even more liquid should policies be abandoned. The answer can only be guessed, but I argue that they probably would be. Many farmers across the world would be stripped of their price protection and would possibly use OTC contracts, backed up by futures, to cover their risk exposure. There is of course no guarantee that such hedging would take place systematically. For example, the situation in cane and beet could mirror the one in the US rice market. However, the profiles of many producers of sugar differs significantly from US rice farmers. First, profits in sugar are lower, similar to the soybean case discussed in Chapter III. In developing countries, cane farmers rarely engage in diversification, triggering maximum exposure to sugar prices. They would be likely to engage in OTCs like they do in coffee, as I explain in Chapter VI. Finally, the participation of large trading house and processors in the sugar market guarantees the participation of sophisticated intermediaries to offer OTCs. According to interviewees, this tendency of farmers to use OTCs is already taking place in Europe since the end of the quota system in 2017.

Despite a lot of the policies being long-term, the Brazilian ethanol policy and the Indian government's habits to enforce import or export bans on short notice resemble the sort of politicization encountered on the rice market. Sugar market participants acknowledge that managing these events is a challenge. If the political distortions of the sugar market are not at the extent as those in the rice market, it still hints at the fact that political uncertainty could only be one factor suppressing financial development, rather than a stand-alone explanation for financial underdevelopment.

IV) Discussion

The comparison between crops in this chapter shows that the question of impact of politicization on financial development is more complex than originally thought to be. In the theoretical review of contract failure I present in Chapter II, the main factor related to politicization that is proposed is the need for price to be freely determined. Although this is indeed a prerequisite for trading derivatives, as fixed prices remove the need for hedging, it is only one expression of politicization. The existing literature understands this factor as the risk potential for governments to fix prices, but fails to discuss two important further matters. The first one is that politicization can, instead of supressing risk, exacerbate it to a level that discourages speculators to trade risk. It still fits the idea that prices are not freely determined, but instead of keeping them stable, make them unpredictable. The second is that the literature does not discuss how politicization comes about, and how it disrupts the functioning of markets. This chapter attempts to bridge that gap to the understanding of financial development.

What appears through the comparative study of rice, wheat, coffee and sugar, is that politicization does not simply suppresses financial development. Instead, it is a certain type of politicization taking place under specific conditions that does. What matters is the propensity of politicization, which can be defined as the expression of political salience, to disrupt financial development. The comparative study tells us that when politicization leads to price stabilization policies reducing volatility, what matters is the effectiveness potential of these policies. For instance, in a globalised market where each market participant has limited market power, there needs to be a collective effort for the stabilization of prices at the international level. International agreements have been largely unable to impose such control on world markets for sugar, coffee and wheat. As a result, they have never successfully supressed the need for derivative trading. In rice however, the large domestic markets with both consumers and producers of countries such as India and Thailand, have made such stabilization possible in the medium term, although the cost of such program make them unsustainable in the long run.

When politicization generates uncertainty instead, the question that should be asked is about the ability of political action to effectively disrupt the market pricing upon demand and supply. The case of rice showed a high potential for market disruption. This is due to multiple factors. Firstly, the conflicting interests of producers and consumers within the same political space is source of more policy reversal making future policies uncertain for observers. In addition, these reversals tend to come suddenly. Instead, in the compared markets, political intervention tends to aim consistently for the same goals, avoiding reversals. These policies are often the results of negotiation that develop slowly and give market participants time to anticipate the effects on their industry. One uncertainty that could be applied to the compared crops just as it does for rice would be on the probability of their price stabilisation programs to succeed or fail. However, the history of international agreements for sugar, coffee and wheat in the 20th century has created a near certainty of failure. The reason to use futures markets was, therefore, not removed and derivative trading was free to develop. Finally, in sugar, domestic price policies do have a domestic effect reducing volatility, but these long-term programs have no real element of uncertainty. They simply remove the need to risk trading domestically while leaving it open internationally.

The topic of politicization brings a new perspective to the various sub-questions posed in this thesis. Refining the understanding of how politicization affect derivative trading, beyond the idea that it supresses volatility, has already complemented the answer to why futures contracts fail. I also answered how rice differs from other commodity markets, with its higher level of political salience and different expression of politicization. When it comes to the identification of patterns of failure in the rice market, naming politicization is contentious. There are no cases where the politicization of the crop has been the prominent reason for the failure of rice contracts. However, as the case of the Singapore conference illustrates, this politicization is widely understood by market participants to be an issue. It is therefore possible that many projects have been discouraged by the politicization of rice, much before it could be a cause of failure. In this way, it does not explain the failure of futures contracts but is a credible factor for the low financial development of the rice market.

V) Conclusion

This chapter investigated to what extent politicization could have contributed to the financial underdevelopment of rice. It appears that rice is an excessively politicized crop. The main reason for that is that both consumers and producers vitally depend on its price: the former to feed themselves, the latter for their livelihood. What is also peculiar with rice is the presence of both groups within the same national political systems, and in developing countries, where food prices are a more sensitive issue. As a result, political entities attempt to establish policies to protect either of these groups and expect that doing so will result in strategic political gains. The fact that there are two potential client groups to satisfy increases the uncertainty towards the policies that could be implemented. This form of politicization thus affects the market in two ways: it removes risk when the price setting is efficient and it creates political risk due to the volatility of these policies.

To confirm that politicization could indeed be a cause for the failure of futures contracts, we examined whether it affected the compared financially developed crops. Wheat and coffee have been politically (mostly diplomatically) salient crops in the past, although they had already initiated their process of financial development. However, it appears that the implementation of this politicization into policies (mainly international treaties) did not succeed in their objective of controlling prices. Therefore, it didn't remove price risk, nor did it create particularly high political risk as these agreements were developed over the long term. Nowadays, only one geographical area of the wheat market is particularly political, the Black Sea. However, it allows for the monitoring of (rather low) political risk in only a single case, and this politicization does not remove the need for price hedging. As for coffee, the absence of the concentration of consumers and producers in a single political system has contributed to the decline of politicization. When the ICA was in place, both groups cooperated at the global level to attempt to control prices. However, consuming countries like the USA accepted disadvantageous terms as their final objective was to prevent producing countries from joining the eastern bloc rather than obtaining a low price for their citizens. However, the relationship between politicization and financial development in sugar is more complex. This market appears to be highly politicized, with almost all countries following complex national sugar schemes. Nevertheless, the risk is often suppressed for farmers at the local level, but not necessarily for processors and traders for whom using futures markets is still justified. Most of the policies in sugar create little political uncertainty as they are developed during long-lasting negotiations and remain in effect in the long run. However, there is a degree of uncertainty coming from the practices of some governments, in particular Brazil and India – two major exporters. If the effects of sugar's politicization are not as extreme as rice, it indicates that the financial development of a market can survive a degree of politicization. These two processes are thus not inversely correlated. Instead,the nature of the politicization matters.

This chapter shows that the politicization of rice strongly affects its potential to develop financially, although it is unable to provide evidence that it is entirely responsible for the low financial development of rice. Therefore, the subsequent chapters of this thesis continue to seek factors that could justify the absence of derivative contracts in the rice market.

Chapter V: Politicization of Futures Contracts and Exchanges

The politicization of strategic commodity markets such as rice represents only one side of the issue faced by the derivatives industry, especially in developing countries. Going further than setting or affecting cash price formation, governments often have a say on the existence of futures markets and/or their individual contracts. Their approach to futures contracts, then, becomes crucial in the process of financial development. Even if those approaches vary, this chapter argues that commodity contracts are politically salient and government interventions in futures markets tend to impede financial development. These interventions are particularly common in developing countries where government rarely see futures markets for their risk trading function, and instead instrumentalise them for political or policy ends. This is even more likely to be the case for rice futures due to the political sensitivity of the crop, as discussed in the previous chapter. Through this chapter, I argue that governments are able to supress financial development but cannot actively promote it in the absence of actors' willingness to trade derivatives. In addition, I argue that their action can be the result of lobbying by groups of actors interested in preventing financial development. I first portray the political pressure applied on commodity exchanges in developing countries. This section shows why these markets are particularly instrumentalised in the Global South. Afterwards, I use the three centuries of government interventions in rice futures exchanges in Japan to further analyse the mechanisms behind the politicization of futures contracts. By choosing Japan, the argument can go further than the geographical location of the exchange and show that rice futures are likely to be targeted even in a developed country because of their political salience in rice economies. This chapter explains why some rice futures contracts have failed as a result of their politicization, but also why some exchanges may not have attempted to list them at all.

I) Commodity exchanges under pressure in developing countries

When I interviewed Lamon Rutten in December 2017, he had held the post of CEO of the ICDX for less than a year. However, his long career in the industry made other interviewees describe him as perhaps the most experienced commodity finance person in the world, certainly when it comes to developing countries. Lamon had previously served as Chief of Commodity Finance, Risk Management and Information at the United Nations Conference on Trade and Development (UNCTAD), senior advisor for the World Bank, and Managing Director and CEO of the Multi Commodity Exchange of India (MCX). Lamon spontaneously started by telling me how the political pressure he has encountered in his career is a challenge to achieving the development of derivatives markets. Through his narration of events, it appeared that the matter (examined in the previous chapter) of government intervention affecting the underlying commodity was to be entirely dissociated from the issue of intervention in futures trading itself. I asked him whether governments in developing countries would often get involved directly with the exchange and he answered, *"it is very common".* In line with this argument, this section supports that the developing countries' governments' distorted understanding of commodity derivatives trading often leads to the failure of futures contracts.

After witnessing government interferences in commodity markets across the developing world during his career in international organizations,[83] Lamon Rutten faced these directly when he worked for MCX. At the time, the exchange was listing a small Basmati rice contract, with enough volume to be maintained but, as this variety represents a fraction of the total global production of rice, too small to be of real significance. Basmati, being a high-quality product with a large share devoted to export, is mostly uncorrelated with the market for white rice. *"That did not stop the different political parties and the parliament to regularly talk about us for being responsible for price inflation"*. Thus, Politicians were arguing that they had a solution to the high prices faced by consumers, and therefore voters, and the solution to this, was to ban futures trading. I asked him if futures contracts for rice were more likely to

[83] Lamon Rutten mentioned, for instance, the case of the South African Futures Exchange (SAFEX) which was under parliamentary investigation following alleged manipulation for successive very depressed and very high prices in the early 2000s. It was later proven that futures prices were only reflecting market fundamentals (Vink & Kirsten, 2002).

be sensitive than for other commodities. In his opinion, although rice is undoubtedly the most sensitive, all commodities, especially food crops, can be targeted. Lamon complained that he had been under continuous pressure to abandon the potato contract during his time at MCX. Today, there is no longer a potato contract listed by MCX. However, his biggest regret was the MCX jute futures, a contract he developed himself. *"In Orissa and West Bengal, there are 20M farmers that primarily bet on jute. They are the most oppressed farmers you can imagine. So we introduced a futures. The final price for farmers definitely increased, maybe doubled, it had a lot of positive effects on the jute economy. But of course, the jute mills and traders were very much against it."* Lamon preferred not to go into detail as he knew he would be quoted, but he explained that the pressures that had built on the exchange since the introduction of the contract culminated in the weeks before an election, largely forcing him to close the well-functioning jute futures down. His experience was illustrative of a country where the complete banning of futures trading is a recurring discussion (Shamsher & Taufiq, 2008).

In Indonesia, Lamon Rutten faced a more ambiguous governmental approach towards futures exchanges. Public authorities initially supported the development of an exchange, but not with the objective of enhancing the trading of commodities. Instead, the government was looking at solving issues faced with brokerage shops. Many brokers offering access to international contracts were engaged in rogue practices, using the money of their clients for their own benefit. *"If you made a profit through a brokerage shop and tried to take the profit out, either the broker disappeared or sent some big guys with a baseball bat. This was a big, big problem. We are talking about billions of dollars in the 1990s".* That was why the government opened up the possibility to have locally based exchanges that they could control. However, once established, the two existing commodity exchanges in Indonesia have often lacked governmental support for their contracts. Even in India, Lamon recalled that policymakers were not fundamentally against the idea of an exchange. The parliamentary delegation visiting him several times a year understood and agreed on the necessity for organised futures trading. *"But when they have to operate on the day to day basis, there are political constraints, political realities"* he concluded. Derivatives suffer from a perception issue, and it appears that the politicians who approach the question of the legitimacy of exchanges through their hedging and price discovery function are often a minority within public bodies. Even if they are given the administrative green light to experiment with futures trading, any issue emerging from these attempts is often used to put an end to those experiments.

Understanding what political constraints Lamon was referring to becomes necessary when studying financial development. The politicization of futures contracts revolves around the suspicion that there could be price manipulation. According to interviewees, in many instances governments have answered the complains of some politically important interest groups about extreme prices by blaming futures trading, even when there was little evidence of market manipulations or price distortions. They believe that blaming futures contracts is an easy way to attract voters (Shamsher & Taufiq, 2008). This is particularly true for high food prices harming consumers. However, the reasons behind governmental reluctance towards futures trading is not always rooted in electoral interests and the need to satisfy certain support groups. There is a sincere concern from policymakers about the potential manipulation of futures. This sentiment is potentially fed by the information generated by the markets themselves. In the absence of derivatives trading, there is very little transparency on the prices at which people are trading (this is discussed in more details in the following chapter), especially considering the individual and local level. An intermediary holding an information asymmetry advantage can easily trade (and often does) a ton of rice at $20 off the market. However, governments, like anyone else, cannot see those market manipulations. When futures trading breaks up the opacity of pricing, the general public is suddenly fed with an instrument to judge whether the market is fair or not. A European rice broker argued: *"What we then see, is that because of this transparency, governments think that they know what is going on – so if you are then 10 cents off of where they think you should be, they think you want to cheat everyone when you have actually brought it from $20 down to 10 cents. But now, they can see it – they could not see it at $20".* The negative political attitudes towards futures is thus also based on a form of misunderstanding of derivatives exchanges functions.

In practice, the approach of politicians in developing countries regarding futures trading is often more complex than the aggressive stances observed in India. Many governments have found reasons to push for the creation of futures exchanges, but the subsequent development of those exchanges has often been chaotic, including their relationship with public authorities.

In China for instance, after the economy started liberalising in the late 1970s, the instability of free market-based prices in grains, combined with the lack of any hedging mechanism, became a source of financial stress for farming communities. In 1988, the state council decided to add the development of a futures market to the government's agenda (Zhao, 2015). A first commodity exchange was subsequently opened in Zhengzhou in 1990. During the first half of that decade, up to forty exchanges were opened across the country, trading all sorts of commodities: agricultural, metals, energy. However, China did not have the regulations in place to control the inflow of speculative money poured into those contracts by state-owned enterprises (SOEs) (Hou, 1997; Zhao, 2015). The situation eventually got out of control, with extremely volatile futures markets unsuitable for hedging first pushing the government to ban, *ad hoc*, specific commodities from being traded on exchanges, before starting to gradually reduce the number of exchanges allowed to operate (Hou, 1997). These bans and closures made the situation worse for the remaining exchanges as the speculative money was ultimately redirected to them and concentrated into their contracts (Zhao, 2015). In 1998, the government completely reformed the regulation of commodity futures exchanges and issued an authorisation to only three remaining exchanges, the Zhengzhou Commodity Exchange, the Shanghai Futures Exchange, and the Dalian Commodity Exchange.

There is little evidence that governments of developing countries are fundamentally against commodity exchanges. They may even support their emergence for coherent market reasons, like in China, or sometimes to solve *ad hoc* issues, like in Indonesia. Certain developing countries also have less coherent arguments when it comes to supporting future exchanges. Government officials in those countries have sometimes shown interest in futures exchanges with the ultimate objective of displaying the image of a mature economy. Ultimately, when there are no hedging or transparency rationale behind the political push, it means the exchange is being instrumentalised. Politicization can, sometimes, go in favour of derivatives exchanges. However, discussions with interviewees revealed a pattern that when it comes to individual contracts, political support tends to fade away, as was shown with the banning of trading in many agricultural commodities in different countries such as India and China. This is in part linked to the lack of familiarity of local politicians and the general public with futures trading, but it is also reminiscent of the political salience of these commodities, as discussed in Chapter IV. As these raw materials have more impact on economic systems of developing countries, there are more likely to be interest groups opposing their trading on financial markets. This also means that the opposition to futures trading could happen in a developed country, and that what matters instead is the political salience of the underlying commodity. For that reason, the rest of this chapter covers the case study of rice futures in Japan. Before WWII, it could be argued that many economic patterns there made possible a comparison to modern developing countries. However, the issues around rice futures trading observed in the 21st century confirm that the political salience of rice has impeded its financial development in rice economies. More importantly, these sections will discuss in more detail the impact of political interventions in futures markets.

II) Instrumentalisation of Japanese Exchanges

a. Governments' role in the development of the pre-war Japanese futures

As mentioned in Chapter I, commodity finance has its roots in the Tokugawa period rice market in Japan. Derivatives trading took time to formalise into well-organised exchanges following clear rules and regulations. If this can be the case for any emerging economic system transiting from informal to formal, the chaotic birth of futures markets lies in the story of government indecision about their fundamental legitimacy.

Between the late 17th century and WWII, the market went through three situations that alternated depending on governmental policies:

- (1) existing futures contracts that were however officially banned by the state,
- (2) existing futures contracts authorised by the state and suitable for hedging, and
- (3) existing futures contracts authorised by the state unsuitable for hedging.

In case (3), despite the existence of contracts to secure sales at a future date, in the absence of convergence efficiency, the Japanese market structure could not be considered fully sophisticated. Government intervention triggered both a rise in financial development under policies transitioning the market from (1) and (3) to (2), and a reversal of financial development when reforms pushed the market from (2) to

(1) or (3). In this section, I analyse the role of the government in the financial development of the Japanese rice market.

Ironically, the oldest proof of the existence of what looked like a futures exchange comes from a prohibitive decree issued in 1693 by the governor of Osaka:

> We have recently heard that many people gather at rice wholesale stores, compete over the rise and fall of rice prices, and name this practice “tsumekaeshi.” Store owners charge both sellers and buyers participation fees, as if it were a gambling dice game. This is outrageous behavior and we prohibit it. If we find out that people continue to engage in “tsumekaeshi,” we will punish both participants and store owners (Sugie, 1985, pp. 12-14).[84]

The shogunate issued a similar type of prohibition in 1696:

> There are people who say they are just buying/selling rice, but instead set up a venue, invite many people, ask the participants to pay fees, set a due date, and speculate on prices in the market. As this is almost like gambling, we ordered them to stop this immediately (Sugie, 1985).[85]

Thus, the first market in futures price trading had emerged without the approval of the government. Gambling was a concern for the shogunate within the frame of a society agitated by debates surrounding moral principles. The blaming of merchants' greed was one focus of the Confucian moralistic tendency to condemn luxury (Gordon, 2003; Moss & Kintgen, 2010). Whether this market was similar to gambling or a proper way to sell in the future, its use of rice bills – certificates issued by rice warehouses that could be exchanged for money – as the underlying value increased the demand for those rice bills. This resulted in the issue of unbacked rice bills that consequently drove rice prices up, which was a factor of inflation. Some authors argue that this was another reason behind the government opposition to *tsumekaeshi* (Schaede, 1989; West, 2000). During the Tokugawa era, the military elite of Japan, the Samurais, were paid in rice that they later converted into cash by selling the grain to brokers (West, 2000). However, the varying size of harvests from year to year resulted in widely fluctuating prices. Consequently, Japan went through economic instability and frequent deflation during the 18th century, strongly affecting feudal lords, who were

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[84] Cited in Moss and Kingten (2010)
[85] Ibid

the primary concern for the government (Hamori, Hamori, & Anderson, 2001). The inflationary effect of the rice bills market, which was once of concern for the shogunate, appeared as a viable solution to falling rice prices, and a rice exchange in Dojima, Osaka, was first legalised in 1715 (West, 2000; Moss & Kintgen, 2010).

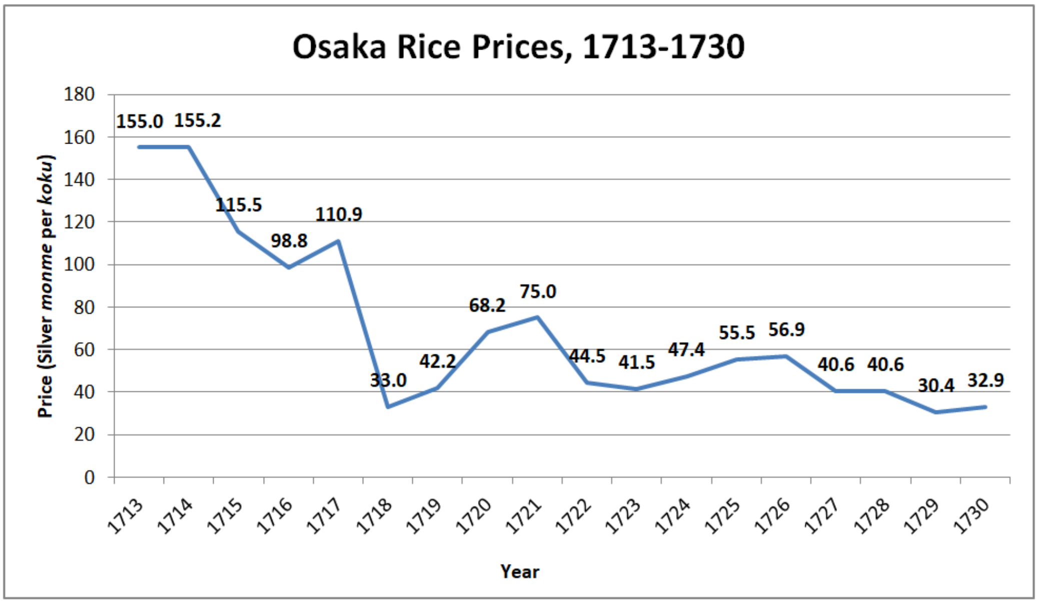

Figure 16: Osaka Rice prices, 1713-1730. (Source: Ryuzwo Yamazaki, A Study of Early Modern Price History (1983), pp.92-93)

Taking over a government with deteriorating finances in 1716, the 8th shogun Togukawa Yoshimune soon decided to implement economic reforms with a particular concern about rice prices (West, 2000). The regulatory policy towards what was still understood as gambling was now shaped to counteract price movements. "The shogunate typically enforced its prohibitions strictly when the price of rice was high, but relaxed its enforcement when the price of rice was considered to be too low" (Moss & Kintgen, 2010, p. 7). The authorised trade in rice bills from 1715 had the expected effect on prices, and consequently on inflation, between 1718 and 1721 (see Figure 16). The market was then closed by the authorities as the price level risked going too high (Moss & Kintgen, 2010). As an increase in price was desirable again soon after, the shogun Yoshimune gave an unofficial assent to restart trading in futures in 1724, before definitely lifting bans on futures transactions in 1728 (Moss & Kintgen, 2010). In 1730, Yoshimune recognised Dojima as the only authorised rice future market in a decree stating:

(1) the aim of officially allowing the market was to increase rice prices;

(2) ‘book transactions’[86] must be conducted only according to conventional practices;

(3) clearing business was restricted to the 50 clearinghouses that had been active in this business before 1730;

(4) exchange members had to follow market rules; and

(5) only Dojima, and no other market, could deal in book transactions (Schaede, 1989, p. 488)[87].

The sensitivity of feudal lords’ rice revenues in Edo era Japan can be compared to that of food security and rural incomes in contemporary developing countries. The approach of the shogunate in the early times of the Dojima exchange foretells many modern Asian governments’ behaviour towards agricultural futures contract, especially in developing countries. The Japanese rulers were – maybe legitimately – more interested in the effect of the market on prices rather than in its hedging function. It explains the short-term policies of the shogunate towards futures. Those policies were to be fitted to the objective pursued. In the feudal economy of Japan at the time, with well-defined social groups, the shogunate primarily intended to stabilise incomes for the Samurai elite, while the hedging function of the Dojima exchange was to benefit merchants, a previously oppressed social group of commoners that rose during the Tokugawa era (Crawcour, 1963; Gordon, 2003; Moss & Kintgen, 2010). Therefore, the discontinuity of support to the market by the government is not surprising, but symptomatic of a tendency of public authorities to set the hedging purpose of derivatives markets in the background when considering the pros and cons in allowing their development. Thus, their behaviour already fitted the framework of the instrumentalisation of futures markets. During periods of prohibition, many merchants kept trading rice bills through a market in which exchange mechanisms continued to develop (Moss & Kintgen, 2010). However, the arrest of many prominent merchants during these periods, such as in 1721, altered participation (Moss & Kintgen, 2010).

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[86] This name was given to the futures trading in rice bills which took place in front of Yodoya trading house and was fully recorded in books.
[87] Quoting Shimamoto (1953).

Also, the depressing effect of bans on prices proves a degree of success of the shogunate's ban to suppress the derivatives market.

After 1730, there were no new government policies to ban futures transactions on the basis that futures trading was seen as undesirable. The government made some attempt to disrupt the market but could not ban it after having already formally authorised it, and higher rice prices had proven to be beneficial for all economic agents, from farmers to samurais (Schaede, 1989; Moss & Kintgen, 2010). In the subsequent period, the government chose to adopt minimal regulatory involvement in the market. The primary responsibility of the shogunate was its authority over the licences (called *kabu* 株) issued to market participants. Numbers differ, but it is estimated that during the Tokugawa period, 50 clearinghouses, 500 rice traders and 800 rice brokers were licensed to use the market, but also to internally self-regulate it through a system based on reputation and informal internal rules. The government denied civil enforceability of futures trading[88] (West, 2000; Shi, Li, & Reshetova, 2016).

The shogunate took a step into regulation in February 1773 when the commissioner of Osaka agreed to hear futures-related suits on designated "suing days". "Dojima traders could thus choose between state and internal dispute resolution mechanisms" (West, 2000, p. 2607). West (2000, p. 2607) lists a few hypotheses to explain this policy change:

- "the government may have thought it was responding to a need for dispute settlement services that the Exchange was not providing adequately."
- "the shogunate sought to increase trading volume and control of the Exchange in general."
- "broader political motives may have been responsible for the decree. … Tanuma intervened in a variety of markets, including Dojima, to gain greater control for the government over macroeconomic conditions".

[88] "By requiring private dispute resolution, the shogunate may have hoped to provide incentives for parties to develop efficient rules and norms to avoid disputes, thus spurring economic growth through market development without expending government resources" (West, 2000, p. 2606).

- “the shogunate may have desired to control the Exchange in order to limit the power of nouveaux riche Dojima merchants who were owed great debts by status-superior samurai."

Although this debate isn’t settled, it illustrates the distortion between final goals being endogenous (in the case of the first two suggested hypotheses) and exogenous to the exchange (in the case of the latter two). However, in both case the government contributed to the functioning of the market.

The involvement of the shogunate in dispute resolution was short-lived, with its discontinuation in 1784 (West, 2000). However, this episode demonstrated the government’s acknowledgement of the legitimacy of the rice futures market as part of the trading mechanism. The period of the shogunate's ban on rice futures already seemed far behind. A new exchange was even approved in Tokyo by the Meiji government in 1871, in an effort to strengthen the political function of the capital, illustrating once more the instrumentalisation of these exchanges (Ito, Maeda, & Noda, 2016). However, in the two centuries following the legalisation of futures trading in Japan, government interventions have mainly been for the control of futures prices themselves.

The work of Ito, Maeda & Noda (2016) gives an insight into the way the Japanese government intervened in the Osaka and Tokyo exchanges during that period and assesses the effects of these interventions. Firstly, it is essential to notice that unlike most modern agricultural futures contracts, pre-WWII Japanese exchanges saw most of the futures contracts being settled physically despite the possibility for cash settlement. It was already possible to deliver a quality of rice inferior or superior to the standard, with the related discount or premium then being applied. The buyers could not know which grade of rice would be delivered until the reception of their warehouse receipt (Ito, Maeda, & Noda, 2016). This system was functioning well while the Japanese rice delivered was mostly uniform, with only minor variations in quality. However, it would, become problematic as the delivery system became the target of the government interventions in the exchange from the late 19th century. At the time, the urban population of Japan grew sharply while the growth in rice production could not keep up. During the last decade of the 19th century, the respective increases were 17% and 7%, creating an imbalance in Japanese rice demand and supply. From that point, Japan became a net importer of rice and about half the rice it imported in the 1910s was procured from its colonies. Mainly, Taiwan and Korea became the two largest suppliers of the Japanese market (Ito, Maeda, & Noda, 2016). The structural transformation of the Japanese physical market pushed the government to frequently intervene in the futures market with the objective of lowering local physical prices. The government wrongly understood that futures markets were driving spot prices and consequently assessed that by raising the supply for delivery on the futures market, Japanese spot rice prices would go down[89]. The need of the government to control the deliverable supply led to fifteen government interventions in the exchanges to order or ban the deliverability of rice from the colonies and low-quality rice between 1890 and 1921 (these interventions are listed in Appendix D) (Ito, Maeda, & Noda, 2016).

In their research, Ito, Maeda & Noda (2016) statistically demonstrate that not only did government interventions not have the desired curbing effects on spot prices, but they strongly affected the convergence. Futures prices were no longer representative of the local prices of the underlying commodity, Japanese rice. It means that during the periods when the government forced the exchanges to make Taiwanese and Korean rice deliverable, futures became inefficient for hedging. These interventions created substantial uncertainty about which rice would be delivered at contract expiration. At the time, Korean and Taiwanese rice was mostly indica rice, while Japan produced and consumed japonica varieties. Rice from the colonies was thus perceived to be much lower in value. The unpredictability of the type of rice delivered to traders long of the contract caused the dislocation of the futures market.

There are records of the exchanges and their participants manifesting their disagreement with such distortive policies. In 1890, the Tokyo Rice Wholesalers Association already pointed out the issues created by the delivery of foreign rice into the exchange:

> Imported rice is different from domestic rice in quality and use. If the exchanges accept the delivery of imported rice, movements of futures prices will not be similar to those

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[89] Unlike at the creation of Dojima, when the existence of unbacked rice bills created inflation, the derivatives markets had reached a degree of maturity where the futures were efficient and reflected the fundamentals of the spot market.

> in the spot prices of domestic rice. Therefore, the futures price will fail to be a fine index of the expected price of rice. We expect that the rice exchange will become instead a gambling place (Tokyo Keizai Zasshi (a), 1890).[90]

Most of the foreign rice was imported into the ports of Osaka and its neighbouring city Kobe – the Dojima exchange was thus more sensitive to this reform and opposed the order (Tokyo Keizai Zasshi, 1890)[91]. Therefore, the Ministry of Agriculture revoked the permit to trade futures contract in Osaka and the exchange was briefly suspended (Tokyo Keizai Zasshi (b), 1890).[92]

In 1898, after the revival of the foreign rice delivery order, newspapers such as the Yomiuri Shimbun once again reported the issues of convergence (Yomiuri Shimbun, 1898).[93] Similarly, the exchanges reacted to the 1912 order to make Korean and Taiwanese rice deliverable by stating:

> The rice futures price will fail to be an acceptable index of the expected spot price of rice because Taiwanese and Korean rice is different in quality from domestic rice (Ministry of Agriculture and Forestry, 1959, p. 107) .[94]

However, the government was not unaware of these issues and in 1918, the Director of the Division of Foreign Rice Management at the Ministry of Agriculture and Commerce, Yoshinari Kawai, acknowledged the disruptive nature of the policies:

> Essentially, the price difference between the spot and the futures prices vanishes at the maturity date. However, after the exchanges began to regard the delivery of imported rice, the price difference between the spot and futures prices did not fall with the maturity date. The futures market showed hardly any relationship with the spot market because the rice futures market was strongly dependent on the price of rice from Taiwan and Korea. The function of the exchange is thus disrupted (Kawai, 1921, pp. 300-301).[95]

Under those circumstances, liquidity in the market decreased, and lower liquidity naturally reinforced the dynamic of lack of convergence.

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90 Cited in Ito, Maeda and Noda, (2016)
91 Ibid
92 Ibid
93 Ibid
94 Ibid
95 Ibid

The market frequently became inefficient because the contract modifications imposed by the public authorities were not pursuing an agenda of hedging performance, but rather price setting. In this case, contract specifications drift away from the specific needs of the market and can soon become irrelevant to the industry. The Japanese futures markets of the pre-WWII era are an illustration of their fragile nature under government intervention. The government could supress participation when it tried but could not easily impose its own terms while keeping the market liquid.

The Dojima market first came to an end more than two centuries after its creation, once again following a government decision. In 1939, with the arrival of WWII, it was absorbed by the Government Rice Agency to maintain stable prices by controlling production (Frédéric, 2011; Whipp (a), 2011).[96] It illustrated one last time its dependency on political goodwill.

These two centuries worth of experience of a rice futures market teaches us several things about policy influence on financial development. In Japan, the financial development of the market was advanced on the one hand by the sophistication of its market actors, the merchants. However, the sophistication of the market structure was more fragile. The government never identified the need to trade risk as a priority. Instead, its interventions in authorising, banning, or regulating futures trading was an intermediary objective within broader policies, such as controlling inflation or integrating colonial rice to the Japanese market. It seems that these interventions have often been averse to the optimal development of the derivatives markets. It has, at times, limited participation through the threat of punishment for illegal trading, or by simply creating hedging inefficiency. What remains unknown is if this inconsistent involvement by the government in shaping the futures market rules triggered lack of trust in the futures contracts, preventing some merchants from generating further liquidity for fear of upcoming changes in policies. The next section will confirm the ability of governments to obstruct the process of financial development, as well as demonstrate their limited ability to encourage it.

[96] Japan only entered WWII in 1941, but Japan had already initiated specific strategies policies for raw materials in the late 1930s (Cohen, 1946).

b. 21st Century Japan: Politicization of rice futures and its implications

The post-war era saw the maintenance of the existing status quo on the rice market. The government was decided not to let go of its control over the staple market it acquired at the beginning of WWII and maintained the Staple Food Control Act established in 1942 (Tokyo Grain Exchange, 2012). Public authorities controlled large parts of the supply chain. If the production was done privately by farmers (often aggregated in cooperatives), the state oversaw the collection and distribution through a limited number of approved shippers, warehouses and retailing facilities. During most of the second half of the 20th century, Japanese individuals did not buy rice in regular food retailers. Rice was sold in specifically designated governmental shops (Otake, 2003). The government unilaterally determined farm and retail prices (Hsu, 1999; TGE Rice Research Committee, 2004). The situation started to evolve in 1995 when The Law for Stabilization of Supply, Demand and Prices of Staple Food initiated the lifting of restrictions upon the distribution of rice. This relaxing of the distribution rules legalised the trading of rice by the private sector outside the government system. This policy was pushed a step further with the implementation of the Revised Food Law in 2004, ending the governmental distribution system (TGE Rice Research Committee, 2004). Therefore, the rice market was back to a system of liberalised trading, implying free-floating prices, which created income risk for market participants.

Under those circumstances, the Tokyo Grain Exchange (TGE) and the Kansai Commodities Exchange (KEX) initiated projects to develop contracts for Tokyo rice and Osaka rice respectively.[97] Even though their projects were independent of each other, the two exchanges cooperated on the background research ahead of contract design. The projects developed through 2005 and a first attempt to get the contracts listed was in 2006.

The law regulating the introduction of new commodity contracts in Japan makes new listings complex (Shamsher & Taufiq, 2008). Unlike in the US, where an independent commission, the CFTC, is in charge of contract approval, futures exchanges in Japan have to negotiate new listings with the government, in particular the ministry in charge

[97] As mentioned in Chapter I, in Japan, rice is not classified by variety but by their prefecture of production.

of the product being listed. In the case of agricultural contracts, TGE and KEX had to obtain approval from the Ministry of Agriculture, Forestry, and Fisheries (MAFF). The MAFF has three options: reject the contract listing, approve a permanent listing or find an in-between solution, which is often used when there is no consensus on the need for futures in an industry. The latter option consists of allowing for a pilot listing, giving it a trial period to gain additional support within the market. In this scenario, the contract must be reviewed every two years, to either approve the mutation to permanent listing, renew the trial period for two more years, or put an end to the trading of the contract.

In 2006, the two exchanges received a strict "no" to their application to list futures contracts. The political environment under which the exchanges attempted to list the contracts made it almost impossible to succeed. The listing was opposed by the National Federation of Agricultural Co-operative Associations (Zen-Noh), the supply chain branch of the JA Group. The JA Group includes different bodies allowing for the functioning of Japan Agricultural Cooperatives, a grouping of almost 700 regional co-ops (Zen-Noh, 2017). According to a Masahiro Yamashita,[98] a former employee of TGE, Zen-Noh was concerned with what effects speculative money would have on the rice market, but more importantly, with losing control over the rice market. He told me that even if they never admitted it, everybody on the market was aware that they benefited from price opacity and did not want to lose their information asymmetry advantage.[99] It was in their interest to deal directly with the farmers. Something else that was not a secret for anyone was the strong political power of the JA Group. Its administrative body, called the Central Union of Agricultural Co-operatives, or more simply JA-Zenchu, dictates the policy of the group but also manages relations with the government. It also lobbies members of the National Diet, in particular those coming from the Liberal Democratic Party (LDP), who are elected in rural areas upon the support of the 10 million members of JA (Stratfor, 2015; Zen-Noh, 2017). The party and the agricultural co-ops have maintained a long alliance since the 1950s (Mulgan, 2000). Therefore, it was not surprising that the party in power would serve the interest of its clientele and oppose the listing, even if according to Mr Yamashita, their

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[98] Interview with Masahiro Yamashita, ex-General Manager at Tokyo Grain Exchange, Tokyo, Japan, May 2018.

[99] This argument was confirmed by three other anonymous market stakeholders interviewed in Japan in March 2019.

independent approach to futures trading in rice was somewhat neutral. This situation also mirrored Gray's (1966) argument of actors' propensity to boycott being a reflection of market power. In this case, going beyond boycott only, JA used their political power to push the government to oppose the contract. This mirrors the situation faced by Lamon Rutten with the political power of jute millers. Importantly, in the case of Japan, the MAFF had a legitimate argument to put forward: they argued that they could not confidently reconcile their on-going price and production scheme and the operation of futures markets on which farmers could sell and hedge. The listing project failed but eventually allowed the two exchanges to learn about the rice market and design draft contracts that they would use again when new opportunities (Rice Market Development Committee of The Tokyo Grain Exchange, 2005).

In the autumn of 2009, the Democratic Party (DP) came to power in Japan, and soon introduced a new set of policies. In 2010, as they had promised in their manifesto, the DP presented an agricultural reform to the Diet (Democratic Party of Japan, 2010). The goal was to transit from a market price support system to an individual income support system. The farmers were being offered a safety net. The exchanges saw this as a new opportunity and applied again for the listing of their rice contracts. This time, they received a more encouraging response from the MAAF. The DP was willing to list the contracts on a trial basis, as allowing farmers to hedge would reduce the need to enforce the safety net in case of a severe price drop. The supporters of the contracts argued that it would also significantly contribute to price transparency (Japan Times, 2014; Whipp (b), 2011). Nobutaka Tsutsui, the senior agriculture vice minister, said "it's difficult to build an argument against an approval" (Whipp (a), 2011). His declaration was probably double-sided, as a sign that the opposition to the contract had no legitimate argument, but also that even if his government had wished to oppose the pilot listing, they did not have a viable argument for doing so, as the LDP had in 2006. One interviewee[100] also hypothesised that the DP was willing to approve the listing to develop a strategic political opposition to the LDP's refusal five years before. The success of the exchanges would have also meant that some farmers could have left their co-op and manage their risk independently. This would have weakened the power of JA and therefore weakened the LDP. Therefore, the support of the DP was

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[100] Interview with three anonymous Japan rice market stakeholder, Japan, March 2019.

for reasons both endogenous and exogenous to the market. Politics had turned around, and the exchanges seized the opportunity.

Listing the contracts was one thing, but generating the liquidity was a completely different problem. TGE and KEX had to do without the participation of Zen-Noh, which controlled 60% of the market (Japan Times, 2014). Like in the US, when powerful co-operatives hold significant control over the supply and oppose the futures market, it becomes an obstacle to the financial development of the grain. Furthermore, the contracts' introduction, in 2011, came in the context of an unstable supply of the national staple following the nuclear contamination of paddy fields due to the Fukushima disaster. The situation generated high trading activity on the futures markets to attempt to secure supply, making the price increase sharply over the first trading session, triggering circuit breakers. The tight price movement limits did not allow trading on TGE, reinforcing the ability of Zen-Noh to denounce what they presented as speculative trading. The co-operatives now had a legitimate argument to publicly justify its refusal to take part in futures trading in these times of crisis (Japan Times, 2014; Whipp (b), 2011). The Fukushima disaster had further impact on the exchanges when the publicly perceived poor management of the crisis brought the DP government down in late 2012, bringing the LDP back into office. In February 2013, the TGE, weakened by the low trading volumes of its rice contract, merged with the Tokyo Commodity Exchange, which did not want to keep the Tokyo rice futures.[101] This was transferred to the Kansai Commodities Exchange to be listed alongside Osaka rice futures. The exchange was subsequently renamed Osaka Dojima Commodity Exchange (ODE) (Japan Times, 2014). This was not enough to attract more activity on the market, and the objective of trading volumes of 4000 contracts a day has never been reached. Even combining Osaka and Tokyo rice, volumes rarely exceed 1000 contracts in a trading day (Japan Times, 2014; Quandl, 2017). The new LDP government was willing to dismiss the policy of their predecessors. However, when a futures contract is on a pilot listing, it must be reviewed at the end of the trial period. The government has to bring strong evidence of the futures undermining

[101] Both exchanges were affected by the low volume of trade. However, KEX and its successor ODE are commodity exchanges of the old tradition – associations of traders that are not for profit. On the other hand, TGE was an incorporated exchange that had to make benefits in the interest of its shareholders.

physical market mechanisms to delist a contract, or convincing proof of hedging effectiveness and participation to transfer it to permanent listing. If the government cannot demonstrate either, the trial is simply renewed. The pilot contract has therefore been renewed five times to date. Interestingly, it is possible that the trial listing suppresses liquidity as many market participants are concerned about participating in a contract that could be delisted shortly.

The new era of rice futures contracts in Japan thus illustrates a different situation from the pre-war era. The government had a changing approach to futures trading depending on the party in power, illustrating the sensitivity of the crop within national affairs. Under the LDP, decisions about futures contracts in rice are dictated by the lobbying power of the JA Group and its large pool of farmer voters. This demonstrates the political salience of both the crop and the futures markets, which leads the control of the futures market to become an instrument of politicization. The arrival of the DP into office opened the door to governmental support for the financial development of the market. The policy of the DP was not reversible by the LDP and its results could have been observed in the long term if the market had taken off, forcing the MAAF to approve permanent listings. However, in the absence of support by a large share of market participants, liquidity could not be generated and the market never took off.

III) Discussion

The lesson to be learned is that a government alone cannot decide to make a market successful. When the futures market is politicized, there is no evidence that a government can effectively promote it against the will of the industry. However, governments seem well equipped to disrupt the functioning of the futures market when they believe they can obtain political gain from it. This is particularly true in none-Western countries where regulations of these markets fall in the hands of the executive power. In North America and Europe, this function is more often performed by independent regulating bodies such as the American CFTC, removing the political instrumentalisation of derivative markets.

Interestingly, it appears that unlike the politicization of the physical market discussed in Chapter IV, where government interventions happen at the initiative of the executive power, the politicization of commodity exchanges tend to be an expression of the government's client groups' agendas. While governments sometimes instrumentalise futures contracts for political goals, it is often actions of lobbying from market actors that drive policies towards agricultural futures contracts. This was the case with the co-operatives of modern Japan, the Samurai class of 18th century Japan, and the millers of the Indian jute market. The ability of these groups to shape policies is a representation of their market power and political influence. It recalls the need, mentioned in Chapter III, to monitor structures of power within a market to predict its likeliness to develop financially. It is not only the ability of the group to influence government policies to prevent the development of futures markets that matters, but also what interest these groups have to do so. That often lies in advantages they derive from the status quo that I will discuss in the next chapter. This time, instead of resulting in their propensity to boycott the contract, which they may do too, it determines their propensity to disrupt financial development through political channels.

Finally, it is important to notice that in the face of the politicization of futures contracts and exchanges, rice does not stand alone. Most staple food goods and strategic commodities can encounter these issues. However, the geographical concentration of rice in countries where it holds both strategic and cultural values exacerbates the issue that other commodities may only encounter in a handful of countries.

IV) Conclusion

In this chapter, I argued that the politicization of food and rice goes further than the politicization of the physical market. Futures markets can become an intermediary objective and policy tool for governments to achieve a variety of goals. Whether it is controlling inflation, integrating colonial rice in a domestic market, rejecting policies from a political rival and attempting to break the power of a co-op supporting this rival, displaying the image of a financially modern nation, or instead giving voters the vision of a government fighting speculation, the success and failure of futures markets are politically salient for governments. This chapter has demonstrated that governments are mostly successful in disrupting futures contracts but can hardly guarantee their success when they wish to. Politicization thus tends to often work against the process of financial development. I have argued that governments often encourage local futures exchanges but oppose individual food contracts. When high prices discontent consumers, governments find it easy to blame futures contracts, which represent a major threat for the financial development of rice locally. Therefore, rice has faced limits to its ability to develop financially within countries that traditionally produce rice. Although the potential for the politicization of derivative contracts for food is higher in developing countries, the political salience of rice is such that developed countries, like Japan, could also be affected. In the following chapters, I will move on examining obstacles to financial development that are specific to developing countries.

Chapter VI: Developing Countries and Financial Development of Commodities

The geography of the rice market may partly explain its struggle to develop financially. Within the realm of this research, it was unavoidable to explore this hypothesis. I previously discussed the limited financial development of the US rice industry. However, it is one of the rare countries with a functioning futures market. What about the rest of the world? Despite the production and consumption of rice in countries like Japan and the US, the world trade is unipolar, with developing countries dominating the market. International trade is dominated by exporters from Mainland Southeast Asia (Myanmar, Thailand, Cambodia and Vietnam) and South Asia (India and Pakistan) while major importers include Maritime Southeast Asia, the Middle East and Western Africa. The previous chapter discussed how the politicization of futures exchanges impeded the financial development of agriculture in the developing world. I now examine other developing markets' obstacles to financial development in rice and compare them to other commodities, especially at the local level. I challenge the possibility of building derivatives markets in an industry rooted in the Global South. I argue that a variety of issues related to the development level of these economies – such as the lack of concentration of highly sophisticated actors, the asymmetry of information and ineffective laws and regulations - may lead to the failure of derivatives markets in rice.

Section I explores the case of Vietnamese coffee exchanges, illustrating the difficulty to establish local futures due to the lack of sufficiently sophisticated local participants. I argue that only exporters can take part in trading futures. However, this model is not viable for rice in Vietnam as it is not only a developing country but also a transition economy: rice exports are still mostly in the hands of two major state trading companies. Therefore, section II focuses on Thai rice exporters, who are often seen as a potential motor of the financial development of rice. I argue that most of them do not wish to trade derivatives, as their risk aversion is mitigated by many factors, similarly to US rice farmers. They are thus less pressured to become sophisticated. In contrast, financial development threatens their information asymmetry advantage.

Section III, details how information deficits, characteristic of most developing countries, prevail in rice and obstruct financial development. Section IV discusses the common weakness of contract law in many countries the Global South. The case of Vietnam shows that in the absence of robust formal contract laws, industries must rely on informal enforcement mechanisms when it comes to OTCs. Some are successful, like coffee, while others fail, like rice, and I explain the difference. Section V asks how soft commodities have developed financially despite the importance of the Global South in their markets. I argue that the shares of the Global North in production or consumption avoided the unipolarisation of sugar and coffee industries in developing countries. As a result, financial development started in the North before extending to various degrees into the South. These markets are thus deceptive models for rice. Implications are discussed in the discussion section.

I) Scarcity of financialized actors

The US case showed the importance of the concentration of sufficiently sophisticated actors to sustain the financial development of the market. When initiating financial development, the mass of actors able to participate becomes even more critical. As discussed in Chapter I, building up a futures terminal market is usually a necessary first stage to financial development. However, the functioning of futures markets requires the participation of actors with an advanced level of sophistication. The pre-requisites, from capital availability and capacity to meet delivery obligations to financial educations, are not fulfilled easily by physical market participants. This section argues that the scarcity of sufficiently sophisticated actors is prevalent in developing countries. This issue impedes the establishment of local futures markets, such as the ones that had been suggested by the expert meeting group in Singapore, in 2012 (RSIS Centre for Non Traditional Security (NTS) Studies, 2012). I use Vietnamese coffee as a case study. There, two attempts at establishing localised futures contracts for coffee in the last decade failed at developing the market financially. I demonstrate that the mass of market actors did not display a sufficient level of sophistication to adapt to the rules of futures trading, or even design them. I argue that rice would likely face similar obstacles.

a. The BCEC

After approval in 2003, the Buon Ma Thuot Coffee Exchange Center (BCEC) was opened in December 2008 as a centre for organising spot coffee transactions upon spot contracts for immediate delivery. In March 2011, it started listing a futures contract designed as a precise copy of the spot contract but with a delivery date set in the future.

The exchange worked with three partner organisations to support its operations: a clearing bank, a coffee inspector and a warehouse operator (Roldán-Pérez, Gonzalez-Perez, Huong, & Tien, 2009). The BCEC, situated in the Highlands, in the heart of the coffee-producing region, belonged to the Vietnamese Ministry of Industry and Trade and aimed to serve the interests of local producers and traders. "The intention was to provide the farmers access to all available information and so negotiate better prices, whereas buyers would be assured of both contract integrity and quality" (International Trade Centre, 2011, p. 141). However, the market failed to attract significant trading activity both in the spot and futures contracts, with volumes declining over time.

Closed in 2013 to carry out infrastructure work, the market reopened in 2015 under a new name – Buon Ma Thuot Coffee and Commodity Exchange (BCCE) – and with a new contract, which extended trading hours and increased the contract size from 2 to 10 tonnes (BCCE, 2015). This new contract entailed moving away from the prior intention of involving farmers in the trade. The exchange failed in attracting trading activity, yet currently, the market is officially only dormant. Despite its website being active in 2020 to report on coffee news, and the government promoting of the exchange's development in 2018 (Prime Minister Nguyen Xuan Phuc, 2018), interviewees were unambiguous about the present situation of the BCCE: "*BCCE is gone"* one said[102]; *"BCCE's current status? Dead"*, another wrote[103].

b. The VNX

Prior to the launch of futures trading on the BCEC, another exchange emerged further south in Ho Chi Minh City. The Vietnam Commodity Exchange (VNX) launched trading

[102] Interview with Mr R., Vietnamese Coffee Exporter, Vietnam, February 2019.
[103] Written interview with an anonymous international trader of Vietnamese coffee, Vietnam, January 2019.

of futures contracts on coffee, steel and rubber in January 2011 (Nguyen T. N., 2015). Therefore, VNX was the first fully-fledged commodity derivatives exchange in Vietnam (Parizat, et al., 2015). VNX listed four futures contracts for coffee (see Appendix E). It offered contracts for both varieties – robusta and arabica – with each having a local and an international contract. All mostly replicated the ICE contracts' specifications but differed by their contract size: local contracts were for 1,000 kg, while international contracts were aligned with the ICE coffee futures (10,000kg for robusta; 37,500 pounds for arabica) (Nguyen T. N., 2015). VNX had been unable to choose between the (unreconcilable) strategies of (i) having a contract size that would allow for the participation of small market actors, or (ii) making contracts whose positions could be offset on ICE in case of lacking liquidity, as their specifications were identical (International Trade Centre, 2011; Parizat, et al., 2015).

VNX was closed in August 2012, officially only temporarily due to issues with the exchange's informatics system (Nguyen, 2015). The exchange never reopened and was abandoned in 2013 (Parizat, et al., 2015). While it attracted some trading volume after its introduction, VNX witnessed a sharp decline in activity in both rubber and coffee throughout its lifetime (Nguyen T. N., 2015).

c. Lessons from the failure of local coffee futures contracts

Despite the failure to build-up liquidity during the lifespans of those contracts, these experiences provided valuable lessons about the limits of financial development of a commodity market at the local level. Three main problems may explain the failure of the BCEC and VNX: financial literacy, farmers' access to the market, and the complexity of the delivery. They are presented below. These issues are likely to be replicated for other agricultural commodities in developing countries if they display similar features to coffee farming in Vietnam. This is mostly the case for rice.

i. Financial Literacy

The coffee market faced a variety of issues regarding the financial literacy of market participants. The concept of a commodity exchange appeared new, even to the market organisers. Often in developing countries, those put in charge of contract development in new exchanges (usually privately held) are either citizens of those countries, who have worked on well-established foreign commodity exchanges, or experienced commodity finance experts – industry professionals or academics – coming predominantly from the West or Eastern Asia. Due to the lack of financial development of its economy as a whole,[104] Vietnam lacked such experience locally. After cancelling the April, May and June 2011 contracts due to infrastructure issues, the Deputy General Director of the BCEC (Mr Vo) drew a first review of the futures trading experience in a Vietnamese financial newspaper (Kha, 2011). He stressed the positive aspect of his staff being able to familiarise themselves with the mechanisms of futures exchanges, but in doing so, he drew attention to BCEC employees' prior lack of knowledge. He explained that as the state owned the exchange, the budget was too tight to hire professionals with derivatives exchange expertise. Even if this issue could be avoided in the case of a better funded, potentially privately held exchange, it still hints at a general lack of knowledge within the industry.

A similar issue was found among market participants. Surveys carried out in 2008 and 2009 to capture agricultural producers' level of understanding of price hedging instruments found that 60.1% of producers did not know anything about them and that only 3.7% were aware of the notion of a futures contract (University of Economics Ho Chi Minh City, 2009).[105] Nguyen (2015) states that the relatively high level of activity of the 2000 accounts opened at VNX (mostly by individuals) and its subsequent decline was an effect of curiosity. Coffee agents and investors got involved in the futures with the motivation of understanding the mechanisms of derivative trading but soon abandoned the market.[106]

Vietnam was facing the issue of an economy financially mostly undeveloped. In some developing countries, knowledge exists within a financially underdeveloped industry as some market participants have been involved in futures markets for other commodities. In Brazil where the Bolsa de Mercadorias developed a futures contract for coffee in 1978, the exchange could rely on:

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[104] I discuss the prior lack of financial development later in this sub-section.
[105] Cited in Nguyen (2015)
[106] An economic slowdown and unclear macroeconomic policies in the second quarter of 2012 drove out investors who preferred saving rather than spending money on new projects (Cuong & Nguyen, 2016).

(i) local staff experienced in developing commodity futures contracts (Bolsa de Mercadorias was established in 1917 for cotton trading) (De Mello, 2006).

(ii) the coffee industry being exposed to futures markets for decades, with the NYBOT contract (current ICE arabica) already a reference for the market.

(iii) a pool of investors used to trade a variety of financial products had been in place in Brazil for some time.

The success of the coffee contract was a function of the financial development of the economy as a whole and not just a specific agricultural commodity market. Instead, Vietnam struggled with this attempt to establish coffee futures – the economy's first experience of derivatives trading. This is potentially a result of Vietnam's status as a transition economy, which limited its exposure to financial products, even in terms of the equity. Therefore, the financial development of the economy is a factor contributing to the ability of financially developing a market. If the financial development of the economy is low, as it often is in developing countries, the prospect of financial development of domestic commodity markets is restricted. However, the cases of rice in the US and Japan also show that the financial development of the economy is, alone, insufficient to guarantee the financial development of the market.

The case of Vietnamese coffee highlights that the sophistication of the market structure and individuals influence each other. If there are no futures contracts in place, there is no incentive to learn about futures contracts. If there is no experience in trading futures, keeping the contract alive is difficult. It is a vicious cycle. Therefore, the matter of financial experience could impede the financial development of rice in countries with little prior exposure to derivatives trading, such as Vietnam. Consequently, a question is which country resemble the Vietnamese case, and which is similar to Brazil. Looking at Southeast Asian exporter, Cambodia and Laos face the issue of the communist economy. Myanmar is also in a comparable situation. After a brief period of socialist rule, it faced under development of its economy due to the embargo against its political junta. Its stock market was only established in 2015.

Thailand is the only country of the region to not have faced these problems. Therefore, it is included as a case study.

ii. Farmers' access to futures markets.

At their foundation, both exchanges intended to be a direct hedging solution for farmers. Usually, farmers benefit from futures exchanges through the availability of public information, as well as from the opportunity to engage in OTC contracts backed up on the futures terminal market (Pochara, 2012). They rarely trade futures themselves. However, the VNX and the BCEC relied on farmers to directly generate liquidity in the market. They adapted the contract size and delivery locations to make futures accessible to farmers. The exchange probably believed that the mass of farmers was an assurance of intense trading, and that they could hold one side of the contract when their trading counterparts would hold on the other.

This expectation of intense involvement from farmers was somewhat ill-judged. Breger Bush (2009) listed five main obstacles to accessing futures markets that, she believes, are likely to be faced by farmers from developing countries: small farm size (production is often too small compared to the lot sizes of futures contracts), yield risk (production variabilities triggering uncertainty regarding the amount of product to hedge), cost (the lack of funds to finance futures accounts), information (little access to data to manage positions), and knowledge (lack of understanding of futures markets). However, the case of US rice proved that many of these issues are not exclusively characteristic of developing countries. Additionally, some coffee farms in Brazil, a developing country, do not face these barriers. Instead, these issues are exacerbated by small-scale farming. The reasons listed above result from the first: the size of the farm. Larger farms have easier access to credit – higher margins reduce the effect of yield risk, which can also be managed through better access to insurance. Furthermore, medium and large-scale farmers have more resources to access information and knowledge (Breger Bush, 2009). However, small scale farming is more prevalent in developing countries and this issue is likely to be particularly common in certain industries of the Global South. This is the case for coffee production in Vietnam, and the same issues would arise for rice in its Asian producing countries.

The BCEC thought that listing a contract for lots of two tonnes would solve the issue. Yet, such lots remain larger than the output of an average Vietnamese coffee farm.[107] In practice, exchange rules set farmer's needs to an even larger production. In order to prove that the physical commodity existed before trading, sellers were required to (i) deposit five tonnes of coffee for inspection by Cafecontrol, the coffee inspector; (ii) own at least three hectares of coffee plantations, although 90% of Vietnamese coffee farmers do not fall into this category (Nguyen T. N., 2015). These rules were necessary to bring contractual guarantees to the futures. However, as such, the contract only opened the market to local traders and intermediaries. Therefore, to build liquidity the market relied on a mass of actors – the farmers – that were, in fact, not sufficiently sophisticated: their ability to trade risk is limited by their physical profile. This is where the Vietnamese coffee contract contrasts with the US rough rice contract. Although some similar issues arose in Louisiana, they did not reach the same extent seen for Vietnamese farmers, who were limited by their small scale operations. In the US, most rice farmers chose not to engage in futures trading but could have, in theory, done so, like some of their colleagues do. Vietnamese coffee farmers were simply ineligible. This point would appear equally critical in any attempt to build futures contracts for rice in the Global South. There is no reason to expect rice producers in other developing countries to display a higher degree of sophistication to access futures trading.

iii. Delivery

As explained in previous chapters, delivery is essential to obtain convergence. Both Vietnamese exchanges struggled with delivery issues. The BCEC settled in the main coffee producing area, hoping to ease access to delivery. However, for many farmers, implementing delivery to BuonMa Thuot – sometimes tens of kilometres away from their farm – was not logistically viable. Farmers are used to selling to intermediaries at farm gates or in nearby villages and are not able to move coffee over longer distances (International Trade Centre, 2011). They ought not to have been expected to make delivery on the exchange without assistance from collectors. However, in the light of

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[107] Two-thirds of Vietnamese coffee farms are smaller than 1ha and the average yield has moved just beyond 2tonnes/ha since 2000 (Marsh, 2007; Gro Intelligence, 2016). As small farms often offer lower yields, most Vietnamese farmers would likely have an output of less than two tonnes. Yield risk incentivises farmers, with an output slightly above two tonnes, to avoid contracting for delivery in the future.

its budgetary constraints, the exchange never had the means to pay commissions to such collectors.

VNX not only had a problem with who could make delivery but also with who could take delivery. As the Vietnamese domestic coffee market is insignificant (only 8.1% of the production was consumed locally in 2017), exporters are consequently the end of the supply chain (ICO, 2019). They were also the only group of actors with the logistical capabilities to move large volumes of coffee to the exchange warehouses and make deliveries on VNX. Since exporters would have no reason to trade with each other,[108] they cannot hold both sides of the contract and would need to deliver the coffee to foreign coffee companies. A coffee analyst explained:

> *"…you can have [exporters] in the futures contract, but you actually need roasters to buy the contract as well. I don't know why a roaster in New York would actually buy a contract in Vietnam, that would probably never take off. I think the World Bank has tried to do that as well on a very local basis, but it is very tough to get the liquidity on the long side…"*

The warehouses were thus destined to remain empty and the arbitrage to fail. However, the exchange had the idea of linking its contracts to international contracts. The similar robusta contracts specifications in the West and Vietnam made arbitrage between the two futures possible, ensuring that their prices would not diverge significantly (Parizat, et al., 2015). This intra-futures arbitrage was the only way of ensuring convergence between the VNX futures and the physical market. Instead of being directly linked to the physical market, the VNX coffee futures were linked to the LIFFE and NYBOT coffee futures, which were themselves linked to the physical trade.

The VNX attempt at increasing the sophistication of the market structure at the local level was only made possible because of financial development at the international level. LIFFE acted as a backup for VNX, solving the issue of rare physical delivery triggered by the low sophistication of its participants. VNX still failed because of the other factors presented earlier in this section. However, without the availability of

[108] Exporters have a precise role of transferring the crop from the local market to the international market, they do not trade the commodity domestically.

international terminal markets such as LIFFE, it would have looked even more evident from the start that the project was doomed. This seems to further imperil the prospect of a domestic futures solving the issue of the lack sophistication of the market structure for rice. Supply chain and delivery on the exchange issues are likely to be similar, if not more pronounced, on the Vietnamese rice market. The small size of trading entities is exacerbated on the rice market where the near monopoly of state trading enterprises, Vinafood 1 and 2, has suppressed the emergence of well-established private companies that could deliver or take delivery on an exchange. The state exporting companies have their own channels of procurement reducing their domestic risk. This situation echoes the US rice market, where the market power of the two co-ops deprived the futures contract from potential liquidity. Even if Vinafood wanted to trade futures contracts, two commercial companies would not be sufficient to build robust liquidity. In contrast, Vietnamese coffee has at least a large number of solid exporting companies.

It appears that sophistication of the market structure at the local level, which is solely based on futures contracts, is hardly viable for agricultural commodities, especially in frontier markets like Vietnam. It is even less likely that farmers could be used as agents of liquidity. Setting up futures contracts in contexts where sophisticated entities are rare creates challenges both in terms of liquidity, but also in physical delivery to obtain convergence. The existence of a terminal market in developed countries is an alternative for achieving some level of financial development in a developing market – local futures contracts can then act as a local relay to the terminal market. However, limitations in the domestic context remain, constraining the sophistication of market actors. For the terminal market to develop, particular factors conducive to that development must be present. Why these are not present in rice is discussed in the next chapter.

II) Thai exporters and derivative trading

Section I presented the irreconcilable obstacles facing the financial development of the Vietnamese rice market. However, not all discussed obstacles are present across the other rice export powerhouses of the Global South. For instance, the issue of financial literacy is less prominent in Thailand, the most advanced exporting country in Asia. Unlike its Southeast Asian competitors, Thailand did not experience communism or socialism, resulting in its advance in the financial development process.[109] Some local participants of the rubber and sugar markets use futures contracts. Consequently, Thailand is often taken to be the ideal place for the financial development of the rice market. The hypothesis is that the Thai rice market may not face the issue of the absence of sufficiently sophisticated actors. This section looks at the group most likely to contribute to financial development: Thai rice exporters[110]. When the London FOX (in the 1990s) and the Agricultural Futures Exchange of Thailand (AFET) (in the 2000s - 2010s) attempted rice futures in Thailand, they focused on generating liquidity from exporters. Situated at the end of the domestic supply chain, exporters consolidate large volumes of the commodity, making them targets for exchanges in need of participation. I interviewed Thai exporters to understand why derivatives projects have failed to attract them. Early on, three hypotheses arose: (i) Thai exporters are not sufficiently sophisticated; (ii) they are sufficiently sophisticated but deliberately choose not to use derivatives; (iii) the market structure is not sophisticated enough to allow for the participation of sufficiently sophisticated Thai exporters. I argue that this business community is made of diverse profiles and that any of these three hypotheses can be valid for each exporter. Ultimately, their case is similar to the American rice farmers. There is space for them to be involved in developing the market financially, but without a pressuring need to, it does not happen.

Thai exporters have a variety of profiles, and thus needs, in the face of price risk.[111] The typical business of a rice exporter involves procuring rice from mills – directly or through brokers – before exporting it. However, some exporters do not fit this typical business model. Many exporting companies own mills around the country. Depending on their milling capacities, they can exclusively procure paddy and process all the rice

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[109] Well-functioning financial exchanges have existed in Thailand since the 1970s. The Thailand Futures Exchange (TFEX), a subsidiary of the Stock Exchange of Thailand (SET), was established in 2004, 29 years after its parent company, to trade financial and commodity futures.
[110] Unlike Vietnam and its two main state rice exporting companies, Thailand has more than 200 licensed exporters, giving the prospect of potential liquidity.
[111] Such analysis of market actors' profiles could not be conducted in Vietnam due to the access issues discussed in the methodology section.

they export or process a share of their export and purchase the rest of the rice from other mills. Inversely, others started as millers that acquired exporting licences afterwards. Some of the rice processed in these mills may also be consumed on the local market.

Risk perception seems homogenous within the exporting industry. Exporters[112] state that prices are fundamentally driven by politics, weather (both domestically and abroad, affecting supply and demand for Thai rice) and the exchange rate. The views on how to manage these risks vary. One risk management practice is shared by all exporters: hedging currency risk. Exporters work with their banks to lock in the exchange rate between US dollars, which they receive payments in, and Thai bath, which they use for procurement from farmers or mills. Exporters hedge the exchange rate, through what can be assimilated to forward contracts with their banks, which are themselves active on the FX futures market, *"which helps"* one exporter said. These practices hint at Thai rice exporters being sophisticated actors, at least partially. They are not directly active in currency futures but understand the need for hedging. The hypothesis that Thai rice exporters are mostly unsophisticated is invalidated to some extent.

Exporters feel less exposed to risk when they hedge the exchange rate, yet are left with price risk related to potential price swing between the export contracting time and the rice or paddy procurement. They usually manage this risk *"in a traditional way",* with a combination of market knowledge and use of storage. Most of them own warehouses to maintain stocks. With their understanding of seasonality, demand and supply dynamics, they refill those stocks when they believe the market is low. When an exporter concludes an export deal, they will cover the volumes on the market if the prices are sufficiently low or use their stocks and refill them after the next harvest. Thai rice has the advantage of having up to three harvests a year, smoothening the market and adding more market lows to the calendar. In contrast, Vietnamese coffee is harvested only once a year, although the harvesting period is longer. Furthermore,

[112] Five interviews with traders and exporters of Thai rice from July 2018 to November 2019. Thee remained anonymous (although one worked for the company Tanasan). The other two were Chandra Jokowdjaja, rice exporter at Ponglarp, and Arjun Verna, a former trader of Thai rice and sugar based in Singapore.

Thai rice exporters can set up other physical hedges. A typical example, suggested by an interviewed broker, would be an exporter that sold 30kMTS of parboiled rice, without being already covered already by stocks. If there is limited availability of parboiled rice (PB) on the market, the exporter may only be able to start by covering 10%, waiting for more PB to be available. The pressure from their demand could push the PB rice price up by approximately $10 for every purchase, threatening the financial viability of the trade. The exporter could instead take a position in an equivalent amount of white rice (WR). As the prices of both types of rice are closely correlated, every time the exporter subsequently buys an additional amount of PB rice to cover their sale, they will release an equivalent amount of WR on the local market. It is the sort of solutions market actors with storage capacities can use in the absence of derivatives. Exporters' ability to manage risk is, therefore, a function of storage space. It echoes the behaviour of US rice farmer in the face of price risk. The concept of physical speculation, or physical hedge, is once more relevant as stocks are purchased at a time when the market is perceived to be low in prevision of upward trends (Cordier & Gohin, 2014; Diaz-Rainey, 2017; Jégourel, 2017). The storability of rice thus contributes to the little use of financial derivatives by certain key market actors, as was already suggested in Chapter III.

Despite the opportunities for physical risk management, some exporters would prefer a functioning futures market, avoiding overcapacity of storage and reducing costs. Despite their enthusiasm, they did not get significantly involved in the AFET when it offered a futures for milled rice from 2007. Rice market participants often state that this contract was not traded because soon after its creation, the government pledged rice prices, removing the need for hedging, before using the market to auction their stocks (McKenzie, 2012). However, this only happened in 2011 after the contract already failed to generate liquidity. As often, the memories about those failed markets are dispersed. One exporter, for instance, justified their – and other exporters – refusal to trade the AFET contract (despite their enthusiasm about derivatives trading) by mentioning issues with the market regulations at the time. While the task was officially in the hands of the Agricultural Futures Trading Commission (AFTC), he recalled finding out market surveillance was being subcontracted to a private company. That contradicted the promises of the communication around the AFET's credibility, which was based on the presence of various government officials on the Board of Directors and the support received by the American CFTC (Office of the Agricultural Futures Trading Commission , 2004; CFTC, 2006). The contradiction between the official mechanisms of regulation and the apparent reality casted doubts on how the market would actually be supervised. *"So by the time it started, the confidence level of all the players was low".* Shamsher and Taufiq (2008) argue that such issue of regulatory framework are common in the context of derivatives markets in Asian developing countries. Some exporters may have been concerned about the fairness of regulation and thought the contract unviable, making the sophistication of the market structure non-existent in their eyes. Other exporters were simply put off by the lack of available counterparts. They explained that when they got involved in the AFET, they lacked liquidity to clear their positions. This is not different from the US catch 22. Many of those willing to see a financially developed Thai market attempted to get involved at first, but they were not enough to create a market. They were dependent on the goodwill of other exporters, but they refused to join the market. This dynamic corroborates this subsection's hypothesis (iii): the sufficiently sophisticated actors do not have an efficient contract to trade. The market structure was unsophisticated, not because of an absence of contract, but because this contract was not viable as a result of a scarcity of potential participants locally.

I also talked to exporters not willing to trade derivatives. When explaining their – and their colleagues – disinterest for futures markets, they often compared those to stock markets. They did not seem to consider a futures contract for hedging, but only saw the speculative aspect of it. One exporter, for instance, gave a puzzling argument that it was not their place to trade futures, while also hedging currency:

> *"We are rice suppliers – we are not a finance company that hedges risk. We offer the service, we sell the rice and fix everything* (i.e., exchange rate). *We do not forecast or play with the price volatility or the exchange rate up and down. Our main business is to supply rice, not to play with the margin of the price change. … If we sell today's price at today's exchange rate, we fix it with a bank with the exact amount."*

It is difficult to understand how this exporter understood the use of currency futures as a hedge (after contracting for physical trade) but the use of futures to lock in the price risk as speculation. This lack of understanding hints that many of these exporters may confirm the first hypothesis - that they are actors with little sophistication. In addition, they state that physical hedging works well enough. However, many people in the market argue that these exporters only pretend not to understand because they intend to protect their market power. Similarly to US co-ops, Thai rice exporters can have an interest in the failure of the futures contract. However, further comparison is not relevant, as unlike US co-ops, Thai exporters have a rational behind hedging price risk. However, some exporters may be privileging their market power. They want to discourage the emergence of futures contracts because they create transparency.[113] As exporters benefit from information asymmetry in the trade, increased transparency could reduce their potential margin over negotiated procurement and selling prices. If this is the case, they shift validation of hypothesis (i) to validating (ii): being sufficiently sophisticated to use the futures market but attempting to impede its development by depriving it of liquidity. In practice, it is complicated to evaluate how truthful they were being on an individual basis. Some of them likely fall in either category. However, an interesting pattern emerged during interviews. As I asked all interviewees about transparency, the narratives of the exporters showing no interests in futures contracts diverged widely from all other market actors acknowledging market opacity. Instead, the "unsophisticated" exporters described a *"very efficient"* market when it comes to information. Instead of telling me about the general ability of the market to process information, they explained their own lack of struggle to access data as a result of their advantageous position in the market and their long-lasting relationship with suppliers and buyers. In the short term, whether those exporters are sincere or not is unimportant. It leaves other Thai exporters enthusiastic about derivatives (and often the most vocal about the issue of opacity) with too few trading counterparts. During the research, no clear profile patterns appeared to help determine the likeliness of an exporter being enthusiastic about derivative contracts or preferring the protection of opacity. However, what emerged was that enthusiastic sophisticated exporters were a minority. In the long term, exporters with low sophistication could become more sophisticated, while sufficiently sophisticated exporters hostile to futures are unlikely to change their position. The next section details the issue of opacity to explain why this is a function of the geography of the rice market.

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[113] See the following section

III) Information Deficit:

> *"… you have a market where there is very little transparency, where there is no real talk of what's happening in the future with any of the professionals, or at least they keep their thoughts very close to their chest. So you don't have a forward curve, you don't have a lot of information; and you just have physical trading at fix prices where you have different people trading at vastly different prices, on the same day for the same product. And you could easily be, let's say, $20 off the market."*

In a few sentences, a European broker[114] summarised the complex issue of opacity on the rice market. This section argues that, above the lack of sufficiently sophisticated actors, opacity is an additional factor impeding the financial development of rice, and that opacity is characteristic of financially underdeveloped markets. This is exacerbated by the lack of transparency generated within developing economies. I start by providing a background on the difficulties of gathering ground level agricultural data in developing countries. I argue that, along other strategic issues, it makes the rice market particularly deprived of market information. I also explain that futures markets have a price discovery function, which is the usual way to solve this issue and process information in commodity markets. However, I argue that it is difficult to start a futures market without previous basic levels of information. Therefore, rice faces a 'chicken and egg' scenario: it cannot establish futures in the absence of information resulting from its unipolar nature but futures would be the solution to this same lack of information. Many markets linked to developing countries, including coffee and sugar, could get over this issue because some part of their activity, whether consumption or production, is geographically located in developed nations. The geography of rice has thus been the obstacle to financial development once more. Nevertheless, I conclude this section by arguing that progress in IT technologies and private intelligence services may be a game changer for rice regarding this issue.

[114] Interview with Ben Savage, rice broker at Jackson Rice, England, UK, July 2017.

a. Lack of agricultural market transparency in developing countries

It is widely acknowledged that lacking, imperfect and sometimes unreliable agricultural information have characterised most developing countries. However, only little research has been done to why this is the case (Perloff & Rausser, 1983; Barrett & Mutambatsere, 2008; Deichmann, Goyal, & Mishra, 2016). This subsection attempts to analyse and synthetise the existing discussion on this topic. This will able the understanding of why information can be an obstacle to local financial development in developing countries.

Information has a cost, whether to produce or purchase. This cost is the crux of the difficulty facing the development of transparent agricultural markets in developing countries. It shall first be acknowledged that, regardless of geographical considerations, it is particularly expensive to acquire and exchange information on commodity markets (Perloff & Rausser, 1983). However, the financial constraints faced by most actors in developing countries creates opacity because most participants face an asymmetric disadvantage. Large trading firms are usually the beneficiary of this asymmetry upon which they can build their market power. Their financial capacities allow them to collect and analyse data. They have an interest in keeping this information private to dictate prices (Perloff & Rausser, 1983). This sort of information asymmetry is less likely in developed countries where there is a profusion of participants with sufficient financial abilities to purchase information. Ultimately, the market power derived from holding information encourages these big players to avoid sharing it. It also allows them to trade similar stocks at various price with different counterparts. This lack of market integration, reinforced by the lack of grading standardisation in developing countries, further complicates the gathering of agricultural price data (Barrett & Mutambatsere, 2008; Deichmann, et al., 2016). Participants are no longer looking for one price that matches the dynamic of the whole market but instead a variety of prices that have dynamics and irrationalities of their own. Although it is an improving issue, the lag of many developing countries in access to information and communication technologies (ICT) also contributes to the inability of disadvantaged market participants to exchange information and close the gaps in prices they trade at (Aker, 2010; Deichmann, Goyal, & Mishra, 2016). Furthermore, agricultural prices in developing countries are often difficult to track because of farmers' inability to store their production, pushing them to sell after harvest, which triggers wider price swings than the ones observed in developed countries (Carletto, Jolliffe, & Banerjee, 2015). Small scale farming poses another challenge as it implies more producers and, therefore, less consolidation of data at the farm level. Any stakeholder willing to collect its own data will face higher costs to obtain reliable estimations of the market dynamics. As I will discuss in subsection c., the absence of futures markets in many agricultural developing markets is a further problem when it comes to disseminating market information.

The one market actor that could attempt to rebalance the asymmetry of information by providing data freely is the state[115]. However, Carletto, Jolliffe, & Banerjee (2015) provide a comprehensive review of why developing countries' governments face difficulties in providing agricultural statistics. Firstly, they face the same sort of budgetary constraints as other actors for data collection. When external donors contribute to this budget, the irregularity of financing flows can ruin the effort to build consistent statistics year after year. When financing is available, human resources can be another obstacle. Importantly, the authors notice major deficiencies in consistent data collection methodology, reducing the reliability of the information collected, therefore, limiting further analyses. However, they also argue that analytical capacities are often themselves lacking. Jerven (2014) also argues that agricultural statistics are highly political information and that they are commonly manipulated by public bodies to serve their own interests. Finally, due to the ICT issues previously mentioned, governments often struggle to disseminate information (Carletto, Jolliffe, & Banerjee, 2015; Deichmann, Goyal, & Mishra, 2016) .

All these issues contribute to making agricultural markets in developing countries opaque. However, this opacity varies depending on the market. The next section will argue that rice, as a Global South market, exemplifies all these information difficulties, and that additional obstacles make opacity prominent in this industry.

b. Opacity of the rice market

The fact that rice is a uniquely opaque market has been a consensus for decades. In his book drawing on his experience at the London FOX in the early 1990s, Julian

[115] International organisations such as the FAO are sometimes involved in producing market information but often do so on a yearly basis, which is not sufficient to carry out consistent market analysis.

Roche discussed the restricted availability of public data on rice, compared to other markets. He states that international trade volumes of rice were readily available from some exporters (e.g. Thailand; USA) but rarer from smaller countries and importing countries, and the data on consumption and stocks were not available at all (Roche, 1992). In my own professional experience on the rice market, I noticed that even the information about trade flows was insufficient to be used for price analysis, as these export statistics are rarely broken down in qualities and varieties. At the time, Roche was urging the Food and Agriculture Organization (FAO)[116] to quickly achieve its project of a price intelligence organisation (1992). A quarter-century later, the so-called FAO Rice Market Monitor tracks prices only monthly, does not provide a transparent methodology for its price index, and, as a non-market actor, has no incentive to do more. The situation on the rice market did not evolve significantly in the two decades following Roche's observation. If particular statistics are available for some countries, they are not complete enough for market participants to interpret the market dynamics, and they often lack consistency (Timmer, Did Speculation Affect World Rice Prices?, 2010). While some countries would provide export data, others would perform better at production forecast or the provision of estimated domestic paddy prices. Trethewie explained the reasons behind this:

> Whether because of resource limitations or due to an unwillingness to share, official statistics are not always available on rice production and trade, leaving outside stakeholders to put together estimates. The lack of statistics on rice in the ASEAN Food Security Information System (AFSIS) exemplifies this reality. Figures on stocks held in emergency rice reserves are also not made public. … There are clear strategic reasons, including those related to competition, for keeping this information from fellow member states, but the dearth of data plays a role in the decision-making behaviour of rice stakeholders. Furthermore, there is very little data available on the stores of rice held by millions of rice farmers, households, mills and traders in the region (Trethewie (a), 2012).

The fact that government to government trades are still prominent in rice is also a reason for countries to retain the market data they hold, or for not gathering it at all. If they were to purchase or sell rice, their negotiation counterpart could not take

[116] The FAO is the agricultural agency of the United Nations.

advantage of their low or high available supply locally. Some interviewees also expressed a struggle to trust their government's data as they suspect them to disseminate inflated price information to support rice farmers without enforcing official policies. However, the difficulty to access the data (discussed earlier in this section) should not be undermined as a genuine reason for major rice-producing and consuming countries to struggle to provide market information.

The problematic gathering of information from smallholders mentioned by Trethewie is complicated further by the geographical fractionalisation of domestic markets, which makes rice prices sometimes not correlate, even domestically. This level of market complexity exacerbates the issue of less advanced Asian countries' limited administrative resources. The gap between the robust information services provided by the various Thai public agencies and the scarcer ones provided by their Vietnamese counterparts is an illustration of this. Despite a few voices praising the efforts of Vietnam to provide information, most interviewees said that the results were unsatisfactory. A Vietnamese stakeholder even said that when information is given, *"the data from the state agencies are often inaccurate"*. In this context, traders complained about struggling to form bids and offers, as well as producing future price expectations.

Comparatively, soft commodity markets are very transparent despite their production and trade flows in developing countries. The reason is found in the structure of those markets and their process of price formations. As the international markets for coffee and sugar are significantly bigger than the rice market in relative terms to local markets, the price is formed differently. The examination of import and export flows in the sugar and coffee markets give more insight into the available supply compared to rice, where the international market is a residual trade. Data on consumption are also more widely available, especially for coffee as most of the supply is consumed in developed countries. Furthermore, the lack of strategic issues and coffee's contribution to food security removes the incentive for governments to hide data. Finally, the smaller number of exporters and international trading houses involved in soft commodities avoids the fragmentation of information between too many actors, making data collection simpler for public bodies. The issue of monitoring internal trade as it appears in rice is reduced in sugar and almost non-existent in coffee.

An issue that the rice market shares with other grain markets is the opacity regarding information coming from China. Global traders are prepared for all sorts of market shocks resulting from decisions of the Chinese authorities or their trading companies. Interviewees often expressed concerns about this uncertainty. *"We don't know what is going on in China"*. The opacity comes in two forms. First, certain information is simply not shared, especially relative to stocks. Second, when those data are made public, it is difficult to determine the extent of their reliability. For instance, market participants are not only worried about whether Chinese stocks figures could be underestimated or more likely inflated, but also what could be the quality in those stocks. As China has been dealing with environmental issues related to soil pollution, an interviewee argued that part of those stocks may have a high tenure in metal particles and be improper for consumption. Those difficulties are not unique to rice. An international grain trader described how information sometimes suggests volumes of wheat held in storage in China, but when visiting the warehouses, these would be empty. Traders know what is held in the ports but are uncertain about what is stored inland. However, the market share of China is far larger on the rice market than in other grains. China, as a wheat importer, is likely to impact the total demand only slightly in a particular year. In rice, depending on policies adjusted in function of the supply available domestically, China often moves from being a major importer to a major exporter from year to year, and *vice versa*.

c. Information function of a futures market

The complexity of making information available on the cash market for rice is reinforced by the absence of financial development. While the next subsection seeks to understand information as a mean for financial development, this one explores the notion that futures markets can also be understood as the mean of information as a goal. The relationship between futures markets and information should be understood, in developing countries, as another 'chicken and egg' issue.

Hieronymus (1971) has categorised the dissemination of information in three ways: information coming from governments, information gathered and shared by private companies, and information produced through futures trading. Compared to other major commodities, a reason for the opacity of the rice market is the very absence of futures trading in this grain. Unlike coffee, sugar and wheat, there is no global contract providing the function of price discovery (Timmer, 2012). Apart from hedging, futures markets have a function of concentrating all information held by market participants who translate it into price expectations and take futures positions accordingly (Anderson & Brorsen, 2009; Prabha, Savard, & Wickramarachi, 2014). If futures prices deviate from cash prices by more than what should be expected based on the current information, actors who can afford to purchase information – often the speculators – arbitrage the futures and bring it back to where it should be. If every informed market participant takes part in arbitrage, all pieces of market information impacting present and potential future demand and supply will be contained in the futures price. It is expected to be a reliable estimate of what spot prices will be in the future (Working, 1961). Therefore, we call it 'price discovery'. Using the case of stock futures, Pati and Padhan explain that "due to market friction such as transaction cost or market microstructure effects, futures market processes information faster than the spot market. Futures price leads spot price, indicating that the futures market performs the price discovery function" (Pati & Padhan, 2009, pp. 7-8). Hieronymus argues that "a spin-off result of futures trading is an increase in the amount of information relevant to commodity price and pricing" (Hieronymus, 1971, p. 99). Many interviewees argued that it is not a spin-off, but a primary function of the futures market, as much as hedging is. Futures markets perform data dissemination not only by concentrating information in one place, but they also make this information public and free. Informed players come into the futures market with their knowledge to correct the price and benefit from this investment in information, revealing this information as a result to the uninformed, who benefit at no cost (Brannen & Ulveling, 1984). That is particularly true for farmers who rarely hedge directly on futures markets but benefit from public information that they could not afford to acquire otherwise. Information from futures markets enhances their bargaining power (UNCTAD, 1995). Lamon Rutten explained how this function was evident at MCX in India: *"one of the things that we noticed before we introduced agricontracts, the rural market used to start very early, at 7 am or 7.30 am; but after, the farmers only came to the market after 9.30, after we and the other exchange NCDEX opened"*. This did not come as a surprise for him as he witnessed the thirst of agricultural markets for price data:

> *"back in the 1990s, when you travelled around India during the harvest season, you would see lines of dozens and dozens of farmers waiting in front of*

telephone kiosks and most of the calls these farmers made was to discover prices. It was already visually evident that people want efficient markets. They want to know what the prices are. They will look for that information, and they will use it."

A soft commodities analyst told me that the availability of prices from ICE with only 10 minutes delay makes the soft commodity markets extremely transparent for all actors. Coffee and sugar farmers all around the world would be looking at the London and New York prices on their phone or hearing it on the radio, using the futures as a benchmark. The rice industry, in the absence of futures benchmarks, misses out on their information function. It is therefore left without means of processing information.

d. Establishing futures under scarcity of information

As I have now established how the rice market is particularly affected by the lack of available information, this subsection explains how it impedes the creation of a functioning futures market. I argue that, even if their function is to concentrate and disseminate information, futures can hardly function when no information is available in the first place.

The first problem with starting a futures in the absence of market data is the ability of contract managers on exchanges to even produce a contract. Their job consists in researching the commodities they aim to launch contracts on, before consulting market stakeholders. The process allows them to understand, in detail, the mechanisms of the market that they transpose into the contract's engineering. In the absence of available information, this research process is significantly impaired. They report not having the available documents to familiarise themselves with the market they work on. Opacity of markets in the Global South even triggers problems in the consultation phase. Lamon Ruten explained how this issue goes further than their own knowledge: *“You go around talking with traders, it is amazing how many things they don’t know. In opaque markets, it is not only opaque for us, it is also for the people in the market.”* The first stage of the futures market’s construction in developing countries is thus complicated by an industry’s struggle to concentrate information and knowledge.

If the exchange managers succeed in developing an adequate contract nonetheless, the opacity is still likely to limit the chance of contract success. Firstly, speculators are kept away from the market by the limited availability of information. In other markets, data can exist but be expensive to purchase and analyse (Brannen & Ulveling, 1984). Such work to collect and process information is an investment for speculators who translate it into a price forecast, leading them to take the right positions in the futures market with a hope to achieve significant returns. For rice, the purchasable information is scarce and incomplete, making such forecasting difficult. In addition, the gathering of information at the grassroots hardly happens. To take advantage of information asymmetry (if a futures market existed), a speculator would need to set up their own data collection scheme to beat the market. It is not part of their job and expertise. The cost of such a scheme would probably outweigh the benefits. Another issue arises when analysing the market: the lack of historical record. Market analysis often involves comparing current situations to historical events to see how current shocks compare to previous ones and anticipate a replication of the effect. Similarly, technical analysis, based on examining average market cycles, is tempered by the absence of detailed historical records. The fragmentation of the rice market also implies that holding a piece information is not enough to understand its implications for different segment of the markets. The market is not efficient in balancing demand and supply geographically and between varieties and grades, which makes price formation challenging to forecast. Not only is information scarce, but its analysis is particularly challenging. Speculators need a thorough market understanding to analyse the causes and effects of rice price changes. Markets such as coffee, that are better integrated and more liberalised, are more straightforward to interpret. A shortfall of production in Brazil will necessarily result in bullish prices for Vietnamese coffee. Speculators often doubt that the time and money invested in such analysis of rice information is worth the reward. Finally, government to government trades are often negotiated confidentially. A Mekong Delta broker[117] explained: *"when Indonesia or the Philippines are buying from us, no information transpires. There are surely people in the first circle of Vinafood who are made aware, but market participants do not have access to those negotiations".* This implies that anyone speculating on upcoming G2G trade would be suspected of insider trading. As a result, this kind of data cannot be used for price forecasting. Speculators can evaluate shortfalls in production in some

[117] Interview with an anonymous Mekong Delta rice broker, Vietnam, July 2018.

countries to anticipate their import volumes. However, obtaining precise figures on upcoming production and existing stocks remains difficult. These various challenges faced by speculators mean that they have little enthusiasm for rice and are unlikely to provide the early liquidity for a rice futures market (Roche, 1992).

The other challenge in building a futures contract for an opaque market is convincing its participants to be involved when they currently benefit from information asymmetry under the existing arrangements. In opaque markets, the largest companies have the resources to collect information by maintaining large relationship networks or by gathering data in unconventional ways (Hieronymus, 1971). For instance, Milo Hamilton, as Uncle Bens' head trader, maintained a fleet of *"people on motor scooters in Thailand to go up the country and check out where the rough rice price was"*. As a result, he could take advantageous positions in Bangkok before the variations in farm price had been transmitted down the supply chain. The issue is that the big companies that can make use of this information asymmetry to negotiate better prices or take early positions in the cash market are often the ones targeted to generate the early liquidity in the futures. For the exchange, the large volumes these companies trade on the cash market represent as much potential hedging volumes on the contract. It is easier for an exchange to bring in a few big players at the start of the contract than attracting many small stakeholders. However, the big trading companies have an interest in contract failure, to protect their information advantage obtained from the market opacity (Baer & Saxon, 1949; Perloff & Rausser, 1983). It is not a secret that a few key market actors present this opposition to a futures market in rice. Julian Roche believes the desire to preserve market opacity was one reason for the failure of his rice contract in the early 1990s:[118] *"you certainly have people who pay lip service to the idea of a rice futures market but in fact rather fancy the idea of being able to tell people the price was $300 per MTS when it was actually $250."* Milo Hamilton agreed: *"there are people who don't want discovery. Their money is made in the dark. They don't want anything to change. And it's incredibly difficult to change anything in a commodity market. … you deal with people who have a lot of money at stake…".* Talking about big international trading companies such as Cargill and Olam, Lamon Rutten told me that these companies, even though they know how to use futures and

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[118] I discuss the failure of the FOX rice contract further in Chapter VII.

will most likely do so enthusiastically once they are in place, do not want anything creating transparency, nor will they contribute to the development of futures in the first place. An analyst argued that large trading companies, having already lost their opacity premium in soft commodities, were likely to be very protective of it in rice. However, Lamon Rutten emphasised that they will not actively sabotage the contracts either.

e. Changing patterns

When Thai exporters argue that the market is transparent, their good faith should not always be doubted. While some may want to keep benefiting from opacity, others may simply relativise it as they witness the information situation improve over time. The transparency of the market has improved over the past decade from the opacity previously portrayed by Roche (1992) and Trethewie (a, 2012). There are two reasons behind this change: (i) awakening of the market to the criticality of the information scarcity, and (ii) the improvement in information technology. The former resulted from the 2008 food crisis. For most crops, futures markets have been pointed at to explain the crisis. The literature suggests that heavy speculation by investors looking at diversifying their portfolio and taking advantage of other macroeconomic dynamics initiated the rise in food prices (Wahl, 2009; Ghosh, 2010; Cheng & Xiong, 2013).[119] In the absence of futures, this explanation does not stand for rice. In rice, studies and market participants often argued that price increased due to the export ban imposed by most major exporters (except Thailand) as a result of panic (Timmer, Did Speculation Affect World Rice Prices?, 2010; Dawe & Slayton, 2010; Sarris, 2010). Exporting countries feared that low stocks and a contracted supply would cause a price rise, threatening food security. They decided that their production should thus satisfy their local demand in priority first. Their withdrawal from the global market resulted in high international prices. In fact, 2008 was a record supply year (FAO, 2020). The crisis was built upon the lack of transparency. Regardless of the validity of this diagnosis, many rice market stakeholders took it as a wakeup call to tackle the opacity issue. Some saw it as a public necessity while other took it as a business

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[119] Others argue instead that the crisis was driven by fundamentals parameters (Headey & Fan, 2008) and that the futures market only reflected those (von Braun, et al., 2008; G 20, 2001; Irwin & Sanders, 2011) even if they eventually exacerbated the problem (Colbran, 2011).

opportunity. The governments that had been making bad decisions upon incomplete information still lacked resources to solve the issue of opacity themselves. Instead, a few private information companies were established in the following years to replicate the models of privately gathering and disseminating data prevailing in other commodities, including energy and metals. Entrepreneurs felt confident that the crisis had provided evidence that decision-making was poor when market actors could not buy information. The emergence of this private model in rice has been slowed by the size of the majority market actors. The unaffordability of information services via subscription is an obstacle for small businesses. The founder of luagaoviet.com,[120] a Vietnamese rice intelligence website, said that even for $20/month, his subscription fee is unaffordable for most farmers and traders in Vietnam. Therefore, the business model of information companies rested upon the commitment of richer market stakeholder to purchase their services. It is the severity of the 2008 crisis that pushed those stakeholders to invest in or pay expensive subscriptions to those market intelligence solutions to make them viable in the long term. Nowadays, despite occasional scepticism over the data provided, most international trading stakeholders closely follow price assessments, market reports and analysis from private companies.

Progress of IT over the past decade contributed to transparency too. Interviewees often mentioned WhatsApp as a game-changer. The messaging app not only reduced the cost of communication at the international level, it made possible the dissemination of market news through group chats. In Asian markets, large Whatsapp groups bring together farmers, millers and traders, together or separately. As all group members receive the same messages, it reduces the asymmetry of information. This also contributes to market integration. People in different regions communicate to align prices with transportation being considered, avoiding situations where villages a few kilometres apart trade at vastly different prices. Furthermore, people are now aware of opportunities for arbitrage. This newly gained access to information by farmers limits the potential profit from information asymmetry for big traders. Consequently, their reasons to oppose futures contracts are fewer. It could result in more people willing to provide early liquidity in new rice futures (Roche, 1992).

[120] Interview with Hoang Hai, CEO and Founder luagaoviet.com, Rice Market Analyst, Vietnam, March 2018.

IV) Lack of contract law enforceability

Apart from the lack of sufficiently sophisticated actors and ability to produce and process information, limiting the production of liquidity for futures contracts, developing markets face another common challenge: the consistency of contract law. I proposed this issue within the hypotheses section of Chapter 1, and Roche (1992) previously argued that it was an obstacle to futures markets. I argue that this is not a direct issue for futures markets, which rely on margin deposits, but contract law is key to the good functioning of OTCs. In turn, those contracts matter in the process of financial development as these simpler instruments give less sophisticated actors indirect access to futures markets, whether these are established domestically or in the Global North. Therefore, OTCs are play a role in financial development as they do not exclude actors up the supply chain from risk trading. However, their enforceability is rarely guaranteed in developing countries. In this section, I argue that the lack of formal contract law can be an obstacle to the expansion of financial development in rice-producing countries. Commodity markets must rely on informal contract enforcement practices, which are not a function of a country's economic system but of an industry instead. However, I also emphasise that while weak contract law is an obstacle to the expansion of financial development, it is not in itself a primary factor for the financial underdevelopment of the rice market. This section uses the case of Vietnamese coffee and rice industries, and their greatly diverging response to lack of enforceability, to expose the challenges created by weak contract law and the conditions under which they might be overcome or not.

a. Contract law in Vietnam

Unlike futures markets, which use a variety of internal mechanisms to guarantee the enforcement of contracts, OTC contracts entail a high default risk and rely, at least in theory, on contract law. However, in Vietnam contract law lacks consistency, making the use of OTC contracts somewhat complicated.

Under the planned economy, all authority over business organisation was in the states' hands – individuals had no right to private enterprise or to contract freely. Commercial contract law was not used at the time and only re-emerged with the Doi Moi in 1986. As such, the Vietnamese legal system should not only be understood in the context of a developing country but also as a transition economy. It is widely accepted that

Vietnam – despite the economic transformations – remains deprived of functioning contract law. “Legal documents related to contracting have overlapping jurisdictions and contradicting rules, which has made them largely ineffective” (Steer & Sen, 2010, p. 1604). A contract can fall under three different bodies of contract law: the Civil Code, the Ordinance on Economic Contracts, or the Commercial Code. As there has been no unification of Vietnamese contract law, it can be difficult for contracting parties to know which law applies to a particular contract and which court is qualified to handle the case (either the civil or economic court) (Nghia, 2002). Agricultural markets are particularly affected by the lack of clarity in the law as it is not clear whether contract law for the sale of goods applies to crops (Nghia, 2002). Nguyen T.P. states that “the consistency of the contract law of Vietnam is still very low. Where violations occurred, it will take a lot of time and costs for parties and the Court to interpret the meaning of contract law’s provisions and parties true will during the dispute resolution” (Nguyen T. P., 2016, p. 16). Nghia (2002) explains that a general lack of knowledge impedes the use of Vietnamese contract law. It is not only ordinary citizens' understanding that is lacking but also that of judges. It is commonly assumed that courts have failed to win firms’ confidence in their abilities to settle disputes. Courts tend to systematically look for (and find) reasons to declare contracts invalid (when it is not a claim of any contracting party) to avoid taking a stance on the litigation. When it does not know how to settle a case, a court can also “submit an official letter to the Supreme Court and request the latter to issue guidance. By doing so, the lower court avoids responsibility for a possible wrong decision” (Nghia, 2002, pp. 306-307). The outcome for the litigating party is then an additional prejudice from the delayed procedure.

The inconsistency of Vietnamese contract law exposes market participants to high default risk when using OTC derivatives. Interviewees have repeatedly expressed concerns about the lack of enforceability of contracts in rice. In this context, the ability to use OTCs depends on the ability of commodity markets to adapt to the legal void. McMillan and Woodruff (1999) explain that it is normal for contract law to take an extensive amount of time to develop. They expect other formal institutions such as trade associations and other intermediaries to serve a contract-supporting function by promoting extra-legal means of contract enforcement. However, it seems that such trade associations are still lacking in Vietnam, especially in agricultural trading communities. They must instead rely on informal institutions and networks to ensure the proper execution and enforcement of contracts. The form and effectiveness of these informal institutions vary widely. The following section examines their effects in the rice and coffee markets.

b. Informal enforcement of contracts in Vietnam.

The Vietnamese rice and coffee markets differ fundamentally in their ability to enforce contracts informally through business networks. A report from the United States International Trade Commission (USITC) on the world rice market pictured a promising market-based hedging solution for farmers, stating that "traders and mills buy paddy rice from farmers either on the spot market or under three-month contracts" (United States International Trade Commission, 2015, p. 221). Vietnamese rice professionals interviewed denied the existence of such a contract and depicted a different reality attached to forward sales. To understand the mechanisms of contracting in the Vietnamese rice industry, it is first necessary to give a simple overview of the structure of its supply chain:

Farmer -> Broker -> (Paddy) Trader -> Miller -> Exporter

The general rule is to sell spot at each stage. However, a "forward contract" can sometimes be used in the transaction between the broker and the farmer, though the time frame is much shorter than that advanced by the USITC. The agreement is usually concluded one month in advance, for delivery immediately after harvest. The broker offers a price that the farmer is free to accept. If accepted, the broker will provide a deposit to the farmer before paying the full amount at delivery. Pre-payments are common in economic systems where contract law is not enforced. McMillan and Woodruff (1999) explain that paying in advance is in theory unrelated to the need for liquidity,[121] but rather creates an obligation between parties. Since the brokers have large relationship networks and hold a position of strength with other parties, they usually do not struggle to obtain the price they want from the paddy traders who depend on them. However, sometimes the reality of the market can result in the spot price falling too far from the forward price for brokers to make a profit by executing the contract. "*If they cannot make a profit, they can give up the deposit; most forward contracts do not have documentation. [SL: It is just an informal agreement?]. We call*

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[121] Liquidity is used here in the sense of early cash payment.

that a 'mouth contract'", a Vietnamese trader and exporter[122] told me, amused that the USITC had idealised derivatives trading in Vietnam. What the Americans believed to be a formal OTC contract was merely a loose spoken agreement that had already involved a cash transfer. Brokers are not the only ones to contract with the farmers, as some big exporters with processing capabilities are sometimes interested in contracting with farmer a quantity at a price, to be delivered after harvest. The exporter pays a first instalment of 5% to 10% of the contract value, with the rest to be paid in cash when the paddy is loaded on boats in the Mekong delta. A broker based there told me:

> *"…the main source of price risk comes from foreign market shocks. For instance, this year, the Chinese government raised the import duties on rice by about 50%. Vietnam was one of the major exporters to China; we exported about 1M MTS of glutinous rice to China last year. But this had a disastrous effect on the glutinous rice market. The market has collapsed, no one buys anymore. And the farmers who were contracted by exporters, who had received their deposit, will not receive the rest. The exporters prefer that the farmers keep the deposit rather than having to go and collect the commodity. The market has collapsed, the paddy is worth nothing."*

In effect, the agreement between the broker and the farmer is not a forward contract, but rather an option for which the deposit would represent the premium, which would be counted within the settlement price. The farmer becomes an option seller rather than a hedger. Such a system of deposits is necessary to the reality of trading derivatives in the Mekong Delta. Asked why derivative contracts (formal or informal) are not more popular in Vietnam, a local rice analyst wrote the following: *"It simply does not work very well. The contract is poor, so buyers and sellers are often very easy to give a reason to cancel the contract [sic]."* Price hedging contracts, by nature, expect at delivery to create a winner and a loser from the contracted price. In the Vietnamese rice industry, the loser feels no obligation to fulfil the agreement. Therefore, there is no incentive for anyone to engage in this kind of transaction: if they win, their counterpart will most likely default; if they lose, they will default themselves. With the deposit, the party expecting to make a profit is assured to be better off than

[122] Interview with an anonymous Vietnamese Rice Trader, Vietnam, March 2018.

they would have been without a contract, even if this profit is negligible. A Thai exporter compared the rice industry in his country to that in Vietnam. He admitted that a long-term relationship was still necessary in Thailand to guarantee contracts. However, forwarding without an initial deposit is a viable option in Thailand as counterparts are becoming increasingly reliable:

> *"we can buy long from the rice mill. In Thailand now the rice mills are getting better – if the price shoots up, they will still send you the goods. But in Vietnam, they will not honour the contract. If the price shoots up, they will just tell you 'look, sorry, the price shot up too much I cannot ship to you', or they just disappear. In Thailand, in the old days, it was like that, but now it's getting better."*

The probability of defaults is not simply a function of a country's contract law. Business practices of different industries also play a role. Just as for rice, defaulting on OTC contracts for coffee is theoretically possible, the party defaulting would not expose itself to much legal risk. However, when I asked Mr R., the Vietnamese coffee trader whether that encouraged defaulting, he depicted a different situation from the rice market:

> *"Trader: Yes, sometimes [defaulting] happens, but the coffee market right now in Vietnam is very transparent. It is really hard to survive, and the ones who survive need to have the commitment. Not many people default on OTCs now.*
>
> *SL: You would harm your reputation by doing that?*
>
> *Trader: Yes! That kind of things. The coffee market is big… but it's small, within the industry…*
>
> *SL: Everybody knows each other?*
>
> *Trader: That's right, so if you default, you'll be on the blacklist of everybody."*

Blacklisting is a common form of informal rule application in developing countries and transition economies (McGrory, 1995; Posner, 1998). It appeared that coffee intermediaries had even more to lose by defaulting than if they were exposed to a suit in a court of law, which would force them to compensate their counterpart financially.

Trebilcock and Leng (2006) offered a theoretical framework that helps explain the effect of a lack of robust contract law on economic development that can be applied to financial development. They ask “whether the existence of a formal contract law and enforcement regime significantly contributes to economic growth in developing countries” (Trebilcock & Leng, 2006, p. 1518). They explore two hypotheses found in the literature: (i) economic development cannot be achieved without strong formal contract law and enforcement mechanisms, (ii) informal contracting mechanisms already make possible the achievement of much economic development. They reconcile those two arguments by concluding that:

> … at low level of economic development, informal contract enforcement mechanisms may be reasonably good substitutes for formal contract enforcement mechanisms. At higher levels of development, however, informal contract enforcement may become an increasingly imperfect substitute due to the presence of large, long-lived, highly asset-specific investments, as well as the prevalence of increasingly complex trade in goods and services that often occurs outside of repeated exchange relationships (Trebilcock & Leng, 2006, p. 1519).

The financial development of the Vietnamese coffee and rice markets fits into this theory. Both industries attempt to use informal contracts, but only the coffee market is characterised by self-enforcing contracts. In theory, the self-enforcement of contracts can be due to a variety of factors including ethnic, religious and cultural ties that can trigger informal extra-legal sanctions from the concerned network. When those networks are not in place, the long-term investment-intensive relationship between two business partners creates enough incentive for them to respect contracts to maintain the relationship (Trebilcock & Leng, 2006). The coffee industry presents both characteristics. On the one hand, the relatively small number of people involved in the market and the transparency of the market triggers sanctions within the business network (that forms a community) in the form of blacklisting of contract defaulters. This is a function of the ability of the industry and its formal (associations) and informal (networks) business groups to process information about market participants (Steer & Sen, 2010). In addition, market participants are concerned about maintaining stable business relationships in the long term, partly because it can be cost-intensive to identify new reliable trading partners (McMillan & Woodruff, 1999; Steer & Sen, 2010).

Another reason might be that price discovery from international futures markets eliminates the need to often change business counterparts to find the best price offer. The rice market is different as participants need to explore more options to find profitable prices and there is a larger number of participants in the industry. Their supply chains are more flexible, and long-term relationships are thus less of a concern. These factors result in a business culture that leans towards defaulting that is self-perpetuating. Since it is the norm to default on contracts within the rice business network, most market actors will do so to avoid significant loses. A mill owner, for instance, would not get offended and encourage the industry to blacklist a defaulting supplier, as they would be likely to adopt the same behaviour if exposed to important losses. There are even suggestions that retaliating against a defaulting contracting partner can damage the image of an individual and drive away their other trading partners (McMillan & Woodruff, 1999). In a nutshell, the differences in business habits between the two markets are stark, to the extent that a rice trader would be blacklisted for pushing for the enforcement of a contract, while a coffee trader would be blacklisted for defaulting. This difference between the two industries illustrates well Trebilcock & Leng’s assertion that “contracting in developing countries is a function of highly context-specific factors that defy easy generalizations” (Trebilcock & Leng, 2006, p. 1577). This produces a situation where both industries are deprived of formal contracting mechanisms due to the lack of enforcement from public authorities. However, the coffee industry can rely on informal contracting due to its small integrated structure and resulting business culture. By contrast, the norms generated by the less transparent and more siloed organization of the rice industry deprives its contracts of any form of reliability.

If we adapt Trebilcock and Leng’s theory by looking at financial development more specifically than economic development in general, the coffee market confirms that at low levels of economic sophistication, with contracts being agreed between close parties, informal channels perform well in making financial development possible. However, this system excludes market actors that are not naturally part of the business network. This is observed with foreign coffee trade houses in Vietnam that do not share similar cultural norms of reliability on long-term relationships and refuse to offer hedging contracts that would specify long periods of time between pricing and delivery. In order to reach a higher level of financial development based on OTC contracts, the

Vietnamese coffee market would need to rely on stronger enforceability of contract law that would allow foreign traders to sue their counterparts in case of defaults (Trebilcock & Leng, 2006). On the other hand, unless it sees a transformation of business culture similar to the Thai case, the financial development of Vietnamese rice depends entirely on the development of formal commercial and contract law. The opportunity for financial development is thus reduced, but this factor would only come into play if there was a futures market to back up the OTC contracts. This is therefore only secondary to the low financial development of rice. In Thailand, for instance, before the amelioration of informal contract enforcement in recent years, the issue could have affected the FOX or AFET contracts. However, the lack of willingness to take part from most exporters and millers made that they would not have offered OTC contracts to farmers anyway. One would also think that if such OTC contracts were offered to particularly risk averse participants, these would quickly develop habit of honouring contracts shall that be their only barrier to hedging.

V) The deceptive models of coffee and sugar

Before validating the 'geography matters' hypothesis, a counterargument must be challenged: why would being produced in developing countries affect rice but not other crops like coffee and sugarcane? In this section, I argue that this is because those two comparative markets are not unipolar. They are globally traded, with developed countries highly involved in the trade and generating the financial development of those markets. They host the most sophisticated actors as well as the contracts. The financial development of those commodities in developing countries is often an illusion; it is most of the time only transmitted from developed countries.[123] Therefore, the financial development of coffee and sugar does not invalidate the hypothesis that the direct financial development of the market at the local level in most developing countries is unlikely.

a. Different market structure.

[123] The case of Brazil stands as an exception, although the prior existence of a world futures market for coffee long before certainly contributed to the establishment of the contract.

To understand how the coffee and sugar markets developed financially, it is important to understand their geographical organisation. The structure of the rice market worldwide is peculiar as it differs from the compared crops in two ways: it is an excessively localised market, with only 9% of rice being exported, and the major players on the international markets are almost exclusively developing nations. The coffee and sugar trade involves substantial participation from developed countries. In 2019, 75% of the global coffee production was exported (ICO, 2020). Most of this coffee went to developed nations with an advanced level of financial development. In 2018, 35% of all sugar was exported, with developed nations being heavily involved in both production and consumption (ISO, 2018). The futures markets of those industries have thus been historically fed by the participation of large and sophisticated trading houses based in the West. The location of most commodity futures exchange in Western countries (Germany, USA, UK and France) indicated that the hedging market was originally destined for their end of the supply chains. In the case of coffee, those countries were the destination. Coffee futures developed through the participation of roasters and merchant companies in the US and Western Europe. In sugar, Western countries served both export (when it was sugar beet) and import channels (for both beet and cane). Furthermore, many contracts have been operating at different points in time and have been replaced by other contracts, reflecting the changing needs of the industries (Hannah & Spence, 1996). However, there was continued sophistication of the market structure, fed by the participation of derivatives hungry sophisticated Western actors. Those markets also benefited from the injection of liquidity from speculators active in financial places such as New York and London. Since they emerged in the late 19th century, many futures contracts for soft commodities have failed. However, this long history has given exchange managers time to experiments with many contract specifications, upon the guarantee that there would always be a large pool of sophisticated actors, hedgers and speculators, to trade them if they were well designed. Such a scenario could not happen in rice as sophisticated actors are scarce and dispersed in poorly integrated markets. The strength of soft commodity markets when it comes to financial development is not only that those global markets create a link to developed economies, they also provide the large integrated markets underlying the futures. The liquidity of ICE contracts for soft commodities reflects the financial development of those liberalised international markets.

b. Local financial development of sugar in Thailand

It is necessary to reflect on whether the financial development of the markets that originated in developed nations, extended to developing countries. I argue that it is not necessarily the case. For example, with Thai sugar, the price system limits the need for domestic actors of the supply chain to take part in derivatives trading. At the beginning of the crop season, the OCSB projects expected revenues for the total industry sell of sugarcane, based on the Quotas A, B, C. These revenues are expected to be shared between the 300,000 sugar farmers and the 55 sugar mills: 70% for the producers and 30% for the processors. This allows for the calculation of an initial price – the one that millers must pay farmers. At the end of the season, the OCSB re-evaluates the total revenue to obtain the final price (Meriot, 2015). If it is lower than the initial price, the shortfall is paid by the government to millers, while farmers keep their extra profit. When higher, the millers compensate farmers (Klanarong, Vanichsriratana, & Sunthornvarabhas, 2016; Manivong & Bourgois, 2017). The difference between the initial and final prices is due to variations in world prices. As the Quotas A and B are at fixed price, it is only the price that exporters will pay to millers under Quota C that can vary. However, as Quota C represents 75% of the sales, these variations can be important (Manivong & Bourgois, 2017). As millers and farmers are protected by the price setting system, only the government and the seven exporting companies are exposed to risk over the year. The consolidation through the supply chain means that exporting companies are giant traders with significant financial capacities. For instance, Mitr Phol and Thai Roong Ruang[124] are respectively the 3rd and 4th biggest sugar exporter in the world. This means that they face no issues participating actively in futures trading to hedge their positions. As a result, Thailand greatly participates in generating commercial liquidity without financial development reaching the higher local levels of the supply chain. The farmers are still exposed to year-to-year price variations of the world market when a new revenue is estimated by the OCSB to determine the initial price. In theory, farmers could hedge this risk with futures as the open interest goes far into the future on the ICE contract. However, the obstacles to access futures markets remain the same as for rice farmers. Interviewed

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[124] They are also the two biggest processing companies in Thailand, crushing about 35% of all Thai sugarcane. They respectively export through the exporting companies Pacific Sugar Corporation and Siam Sugar Export (Manivong & Bourgois, 2017).

traders and analysts explained they were not aware of any of the millions of sugar farmers in Thailand trading derivatives. Even if for some of them, the scale of farming is significantly larger than the average rice farm, they are still not engaged in hedging. It is not possible for millers to offer farmers forward contracts far into the future either as the procurement price is, once again, not freely determined.

Therefore, there is high sophistication of some local actors but mostly for big companies in the later stages of the export channels. This does not represent the financial development of a crop at the local level that could be replicated in rice. Instead, it is an integration of the biggest actors of the local industry into the financially developed global market.

c. PTBF for Vietnamese coffee

It would be simple to argue that the financial development of small local actors never happens in developing economies. In coffee, many small producers are sophisticated enough to make use of derivative contracts on offer. However, those contracts are only made possible by the pre-existing financial development of the market at the global level. I use the case of the Vietnamese OTC market for coffee to illustrate the interaction of the local financial development of the market.

As mentioned earlier in this chapter, a limit to the Vietnamese coffee chain's financial development, in the absence of formal contract law, is foreign trading houses' scepticism towards informal contract enforcement. Foreign trader interviewees maintained that contract default is a risk and pricing closer to shipment is preferable. Instead of offering forward contracts for Vietnamese coffee, they introduced shorter-term 'Price To Be Fixed' (PTBF) contracts that have become highly popular throughout the last decade. These kinds of OTCs ensure the transfer of a commodity without setting the price, mandating only the grade, quantity and delivery date. The contract specifies which party holds the right to fix the price, doing so upon the futures market price – usually LIFFE/ICE for Vietnamese Robusta – at fixing time. We talk about seller's call or buyer's call. The global coffee market traditionally uses PTBFs at buyer's call, giving roasters the advantage in the transaction (May, Mascarenhas, & Potts, 2004). However, in Vietnam seller's call prevails – it is first awarded first to farmers, giving them market power. Subsequent actors along the supply chain (trading and processing intermediaries and exporters) use similar contracts to continue transferring ownership while waiting for farmers to fix their price. As PTBF reach them, international roasters use futures to offset their risk. Once the price is fixed, they settle the futures position and use the cash to settle the PTBF contract, and payments go back up the supply chain. It is possible for farmers to transfer ownership – through delivery to the PTBF buyer – of still unpriced coffee. The supply chain can use (process or ship) the coffee but *"everybody is waiting for the farmer to fix",* a coffee analyst explained. This system allows farmers without storage to stay in the market by pricing at a later date.

Paradoxically, these contracts do not fully allow for the sophistication of the decision-makers – the farmers – unlike it does for the market intermediaries. The market structure's sophistication at the farmer level is only partial, as they can buy the right to keep their market risk after harvest but not the right of locking in a price before harvest. The ability to trade market risk this way is not the optimal sophistication for farmers, as most of them are risk adverse and would ideally fix their price in advance. Instead, intermediaries in the supply chain, thanks to PTBF, could either stay in the market, or lock in their price at future date, which they commonly do. For instance, an exporter engaging in a PTBF with a local trader assumes the risk of the contract as the buyer. However, when they enter a similar type of contract with an international roaster, it is as the seller. When the local trader executes its call and fixes the price, the exporter only needs to instantly do the same on its contract with the roaster to receive their margin. Therefore, exporters describe the trade as a *hedge.* It is the case for all local intermediaries. Going back up the entire supply chain, we find that PTBF contracts do not offer a hedge to farmers. For farmers who have not been able to invest in storage capacities, a PTBF mostly allows for the moving of the crop, avoiding any on-farm post-harvest crop risk,[125] as well as the receiving of a first share of the payment (often agreed in PTBF) before definitively fixing their price. As my interviewee regularly repeated, these contracts *"gives farmers flexibility"* to take advantage of the market. However, they are not given all options to manage price risk. With a PTBF, the farmer is not protected from downward movements in the market until the price is fixed. Coffee farmers thus display high levels of sophistication in marketing their crop using a PTBF

[125] In contrast to farmers in heavily stormed hit Louisiana mentioned in Chapter III, these farmers don't seem to perceive production risk as a primary concern.

but are not hedging per se. Nevertheless, they avoid a loss of opportunity to benefit from a post-harvest price rally. Combining this with the transfer of storage risk to the buyer, PTBFs thus allow farmers to partially trade risk. This instrument creates a difference in sophistication of the market structure at different stages of the supply chain. It gives more risk trading options to intermediaries than to farmers.

The other important observation about the impact of PTBFs on financial development is the articulation between the local and global derivatives market. The pre-existence of a futures market, and therefore, of financial development of the global market structure, is an almost *sine qua non* condition of the use of PTBF contracts. There is a need for a permanent underlying price benchmark for prices to be fixed against, and this is provided by futures markets. Spot indices could also be used, but liquid futures present the advantage of an enhanced trust value for all parties. More importantly, a terminal futures market allows international companies down the supply chain to take offsetting positions and thus offer PTBFs in the first place. If this were not the case, it is unlikely that any other intermediary would be willing to offer a PTBF to their sellers while being unable to hedge it. The local OTC market is an expansion of the global market into developing countries through simple derivative instruments, rather than a sign of spontaneous local financial development. Similar structures of risk transmission through the supply chain could, therefore, not be replicated in rice. The financial development of a market in a developing country is mostly the result of a top-down process, an expansion of the global risk trading onto local industries.

V) Discussion

As it appears through this thesis, the reasons for the low financial development of the rice market are multiple, and they often feed onto each other. It creates a challenge in the process of pinning what exactly is a factor for financial underdevelopment, and what is a cause for these factors. This chapters discusses the effect of geographical unipolarization of the market in the Global South on the prospect of financial development and establishes that it cannot be an endogenous dynamic. However, it appears that this geographical specificity mostly serves to group a wide range of issues that are more likely to arise in developing countries. Importantly, I did not fail to recognize that these issues are not always taking place in developing countries – using the case of Brazil and its sugar estates – and should also reaffirm that many of these issues can take place in the Global North too. What the developing country argument suggests is that these countries are likely to accumulate the factors that impede financial development, such as market opacity and the lack of sophisticated actors. This coincides with the argument made in previous chapters that it is the accumulation of obstacles to the functioning of derivative markets that causes their total absence, as it does for rice. Once again, when issues accumulate, they start interlocking with each other. For instance, market opacity feeds the market power of key actors that boycott futures trading due to its price discovery function. Similarly, the lack of enforceability of contract, although it can be compensated for in many ways, affect the development of OTC markets.

In many ways, the situation in Thailand and Vietnam mirrors the case of the US. Market actors that are expected to trade derivatives (US farmers and Thai exporters) have the possibility to not do so, based on their ability to physically hedge and diversify. Some sophisticated actors (US co-ops and some of the Thai exporters) prioritize the protection of their market power over their ability to hedge risk. Once again, the study of actors' interests and behaviours is highly significant to the study of financial development, beyond the simple level of financial sophistication of these actors. It appears that being highly sophisticated is not a guarantee of wishing for the market to develop financially.

Both the cases of the US and Southeast Asian countries demonstrate the important interaction between the OTC market and futures market. If terminal markets are highly liquid, it is because, through various OTC instruments, they bring risk trading up the supply chain.

What is interesting is that despite sharing various characteristics, the cases of Thailand, Vietnam and the US diverge severely in one aspect: the US has a sophisticated market structure with the Rough Rice contract. That tells that despite the industry specific issue to develop financially, the economic environment of a commodity market matters to an extent.

VI) Conclusion

In this chapter, I argued that the financial development of the market is a top-down process, an expansion of financial development from the global market, generated in the Global North, progressing to some extent into the local markets of developing countries. At the local level, issues with information and, to a lesser extent, contract law, limit the ability of developing markets to develop financially by themselves. More importantly, in the local markets of developing countries, there is a scarcity of sufficiently sophisticated actors willing to trade derivatives in the early stage of the contract. Those actors who can and wish to participate cannot produce liquidity in a futures contract by themselves. They are facing other market participants that are either insufficiently sophisticated or sufficiently sophisticated but reluctant to the sophistication of the market structure, as it would solve opacity that benefits their business. I have argued that in its early stages, financial development needs a concentration of highly sophisticated and willing actors to maintain futures contracts. As the sophistication of the market structure increases, the introduction of OTCs also renders the participation of less sophisticated actors possible. This is a condition to the financial development of the local level in developing countries. This chapter has argued that this stage is obstructed in many countries across the Global South by weak contract law. However, as this stage is secondary, although it could affect rice if the industry remains unable to enforce these contracts informally, it has not been a primary cause of financial underdevelopment till now.

With economic development, it is possible that some of these issues will be solved. However, rice would need a global futures contract to see a degree of top-down expansion of financial development that results in participants' ability to trade risk. It would also allow the willing sophisticated actors of different national market to trade with their counterparts in other countries. The final chapter will question the possibility of such a contract emerging and succeeding.

Chapter VII: The Making of a Global Contract

As discussed in the previous chapter, the financial development of soft commodities happened in the context of globalised markets. The contracts for coffee and sugar in London and New York, just like the contract for wheat in Chicago, are global contracts. They are liquid, making the sophistication of the market structure substantive because people in those markets across the world use it as hedging instruments, not only the ones for whom the specifications of the contracts match the commodity they produce or trade very closely. A large number of varieties and geographical origins are, therefore, part of the underlying market.

In Chapter VI, I argued that the construction of commodity futures contracts at the local level is complicated because they are rooted in the context of the developing economic systems of the producing countries, which rarely fulfils the needs of derivative finance. An obstacle to financial development is that the sophistication of the market structure hardly lasts in the absence of willing sophisticated market actors. I have previously exposed the factors attached to many developing countries that restrict the sophistication of the market actors in the context of rice trading. There are willing sophisticated stakeholders in the rice market, but they are too geographically dispersed to create liquidity at the local level. If a rice futures were to be global, it would offer all sophisticated actors the opportunity to meet in one market and therefore maintain a newly created instrument that makes the market structure increasingly sophisticated. This chapter explores that possibility of aiming for global contracts to attract liquidity from various origins. It questions why rice did not see the emergence of such global contract like coffee, sugar and wheat did. I argue that there are two distinct paths in constructing a global contract: a contract deliberately designed to be used all around the world by international trade actors, or a contract specified for local use before becoming a world benchmark. I examine the lessons learnt from my compared crops and analyse how these transposed onto rice. I find that both of these models meet strong obstacles to serve for the financial development of rice, and were, therefore, never viable. In the face of the difficulties to adopt these models, I examine the most recent attempt to develop rice financially through the use of other derivative instruments, swaps and index-based futures, as the industry is currently aiming to replicate the recent success of the Black Sea wheat market. I find that this model could solve some of the issues discussed in this thesis, potentially leading to a higher degree of financial development of rice in the future.

I) The two paths to a global contract

The financial development of a commodity at the global level can follow two different paths regarding the establishment of a futures. The first option is a local contract becoming a global benchmark against which other origins and varieties of the commodity are hedged. The Chicago SRW (soft red winter) Wheat contract illustrates this model. These local contracts primarily target the involvement of domestic producers and processors, as well as intermediaries in the national supply chain. As the contract grows in domestic liquidity, market participants in foreign countries start using this contract to hedge their own price risk. This option requires the different varieties and origins[126] of the crop to have a consistent price relationship with the deliverable growth specified by the contract, to guarantee hedging effectiveness.

Another logic is to establish, from the start, what I will call a world or international contract, as is the case for sugar and coffee. These use physical settlement, accepting different origins at one or many delivery points. These contracts target international trade. They specify crops in the form most commonly traded internationally. This system needs a consistent grading of the commodity with a premium and discount from the reference price, such that a large share of production is deliverable on the contract across the world. Delivery usually takes place in ports, either FOB[127] in the producing countries or in port warehouses in importing countries.

In this section, I examine these two options through existing contracts in sugar, coffee and wheat. This will allow for understanding their mechanism. Later this chapter, attempts to fit rice within one of these traditional models.

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[126] Origin refers to geographical origin, aka the country where the commodity is grown. The word growth is also used in some markets such as sugar.
[127] Free on Board: the price includes the delivery on board a ship.

a. The global benchmark system

The subsection tackles the global benchmark system. This model has been common for grains such as wheat and corn. It consists of using a functioning domestic contract, often located in a Western country, and in time using it as a reference for the market globally. Discussing the mechanisms of this model will be useful as I will subsequently question whether the CBOT rough rice contract could serve as a global benchmark.

Before examining the functioning of global benchmarks, it is useful first to understand how domestic contracts are built. It will also later be valuable to have broadly discussed their geographical organisation. A futures exchange most often offers a contract upon a commodity produced or extracted in its home country. It designates delivery points in a restricted geographical location: the delivery points should be close enough to avoid variations in prices due to transport fee differences between these delivery points. The delivery area may or may not be close to the exchange itself. Historically, exchanges were established close to strategic points for delivery. The US wheat market in the 20th century illustrates this, with contracts in Chicago, Minneapolis and Kansas City. However, as exchanges evolved, it became more efficient to have exchanges in cities where speculators were located, while the commercial delivery could take place elsewhere. The case of rice is one clear illustration: the exchange hosting the contract is based in Chicago and the physical delivery is in central Arkansas. With time, and through merger and acquisition, the wheat market also consolidated in Chicago.[128] As for primarily targeted physical users, they usually operate around the geographical location of delivery or must operate within the same supply chain to obtain a coherent basis. Louisiana rice farmers are a good illustration of this second case: they produce a similar type of rice to Arkansas farmers and are part of the same consumer markets. Rice prices in the two states are therefore related. In domestic contracts, the liquidity is in part generated by producers and traders directly concerned by the underlying commodity of the futures contract, holding most of its short positions and some long positions (speculators should hold most remaining positions). The liquidity of a contract should thus, in theory, indicate the financial development of a specific geographical area of a market.

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128 CME now hosts the Kansas City wheat contract.

In practice, this logic no longer stands when a contract becomes a reference for other geographical areas of a market. The large OI and trading volumes in wheat or corn futures in Chicago are in part generated abroad as the futures contracts serve as global benchmarks. The high liquidity of these grain futures, therefore, creates confusion upon what geographical market is being developed financially. The case of wheat illustrates this issue. The Chicago SRW Wheat Contract is the most liquid wheat contract in the world. The specifications of this contract – including the grade deliverable and the location of delivery points – makes it primarily suitable for use by US producers growing and trading soft red winter wheat. They can be found in Illinois, Indiana, Arkansas or Mississippi. Despite the liquidity, American producers of other types of wheat usually stay clear of trading Chicago futures. Farmers growing hard red winter (HRW) wheat (mostly found in Oklahoma, Kansas or Nebraska) use the Kansas City HRW wheat contract and farmers growing hard red spring (HRS) wheat in North Dakota chose the Minneapolis HRS wheat contract. Price movements between different varieties tend to be well integrated, but producers still prefer the near-perfect hedge provided by contracts designed for their market, reducing basis risk further. Although the liquidity is small relative to Chicago, Kansas City and Minneapolis can still be qualified as liquid contracts. The open interest figure of Chicago SRW Wheat contracts is approximately three times that of the Kansas City HRW Wheat contracts. However, the US produces approximately twice more hard red winter wheat than soft red winter wheat. Does that mean that the market alongside the Mississippi river is much more financially developed than the market of the Great Plains? Not necessarily. Instead, the Chicago SRW wheat contract serves as a global benchmark for wheat trading. Most originators of wheat, who would not benefit from a local wheat futures contract, hedge their price risk against Chicago. They chose this contract over Kansas City or Minneapolis, even if they do not produce SRW, because unlike American producers, they are faced with a significant basis risk for the three contracts and therefore chose to use the most liquid one. Besides, the internationalisation of the Chicago contract means it is more likely to reflect variations in the global market than the two others that solely reflect the American trend. The liquidity of the Chicago wheat contract is an indicator of the high financial development and integration of the international wheat industry, rather than the local market producing and trading its underlying commodity only.

The transformation of a contract into a world benchmark can be an initiative of the exchange attempting to attract foreign liquidity or a spontaneous dynamic of international market players looking for a viable hedge that the exchange does not actively trigger. The three highly liquid agricultural contracts (corn, soy and wheat) at the CME exemplify these two options. For example, until 2000, delivery on the corn and soybean contracts was made in warehouses in Chicago, Illinois or Toledo, Ohio. That year, to turn those futures into international contracts, CBOT product developers implemented a fundamental transformation in the delivery mechanism. The contract was changed to delivery on Illinois River barges, along the export channel. The commodities, once delivered, were then dedicated to being sold abroad. From that point, the futures market was not discovering a US price anymore but an export price (an international price). In liberalised global markets, such as corn and soybeans, export prices naturally converge and establish stable spreads representing the cost of transport. Any sophisticated actor involved in the export or import of those agricultural products can thus hedge their risk against the Chicago futures with the confidence of keeping reasonable basis[129].

Creating an export price is almost a guarantee of success for an undifferentiated commodity[130] because the international market integration is natural if the trade is liberalised. For example, there are no major disparities in quality (or in potential use) between American and Brazilian soybeans. Wheat was facing different constraints to become a global benchmark. The market has many different varieties and quality levels to manage. Fred Seamon, the product manager at CME, explained that the market took care of this issue:

> "*… there is about 20 wheat futures contracts around the world, most of which are not liquid. Chicago wheat, because of its liquidity, became the world benchmark. Even though the type of wheat that is being traded is a small percentage of the global wheat supply, so that was a case where [the market] organically was looking for liquidity. There is correlation there, don't get me*

[129] Although other futures for corn exist, they are illiquid in comparison to the Chicago contract.
[130] Corn and soybeans are mostly undifferentiated crops. There is no significant market fragmentation between varieties and origins.

wrong, it is a hedge. Even though there are all those differences, wheat does correlate across all those different classes of wheat."

The price of all types and origins of wheat around the world tend to move in a synchronised fashion because different types of wheat can be blended into flour, and the market is liberalised. As a result, hedgers outside the US will not necessarily target the contract specifying the type of wheat they trade themselves. Instead, they tend to target the most liquid contract that reflects changes in global prices most accurately. This attraction for liquidity has been consistently referred to by my interviewees. Market participants are looking for *"that ability to trade with a minimum of slippage".* Therefore, the SRW Wheat contract globalised naturally, before the exchange decided to play its part in giving this contract its global dimension. *"We have added river delivery, we've added some regions in Ohio for delivery that load shuttle trains that transport to the Gulf. So we've made our wheat contract more internationally representative of the soft wheat market. But most of that came to us organically",* Fred Seamon explained. Once a contract became global, it becomes much more liquid. It is a virtuous cycle: the most liquid contract attracts hedgers and speculators, and their involvement in the market increases liquidity.

b. The international contract system

To create a global benchmark, there is a need for an already liquid futures at the local level. This does not exist for all commodities. I showed in Chapter VI that the financial development of the coffee and sugar markets at the local level is somehow overestimated. The physical liquidity of the contracts for those two commodities is essentially the result of their use by international traders. This is possible because the futures currently hosted by ICE for sugar and coffee are designed for their global market. They are thus ideal examples for the international contract model. A variety of factors within their specifications makes these contracts international: their delivery location and systems, the currency they are traded in, and the variety of growth and grades eligible for delivery. This sub-section presents this model of international contracts, allowing the examination of these models' viability for rice later in this chapter.

Sugar and coffee have two major global contracts listed on ICE each, used as global benchmarks for the commodity. These are the Sugar No. 11 Futures, for raw cane sugar trading, hosted in New York City; the White Sugar Futures (formerly known as Sugar No. 5 futures) for white refined sugar (from cane or beet), hosted in London; the Coffee C Futures, for arabica coffee hosted in New York City; and the Robusta Coffee Futures, for robusta coffee hosted in London. All these contracts are denominated in US dollars, easing their use for market participants across the globe.

The delivery system differs between the two commodities. Delivery of coffee takes place in licensed warehouses in ports across the West. For arabica, the coffee is deliverable to five ports in the USA, and in single locations in Germany, Belgium and Spain. For robusta, the coffee can be delivered to many ports in Western Europe (UK, Belgium, Germany, Netherlands, Spain, Italy and France), as well two ports in the USA. It reflects that through history, Western European countries and the USA have owned very large shares of the world imports. These countries were, therefore, the expected location of the most demand for delivery. Although demand has grown recently in Eastern Europe and Eastern Asia, the traditional Western import markets still represent more than half of the coffee consumption and, as a result, constitute a reliable benchmark (Bain, 2013). Contrarily, the sugar market sees less consistent stability in the major importers as most countries in the world can produce sugar through cane or beet. Since many importing countries (such as China, Indonesia and Pakistan) aim at reducing their dependency on import, and others (such as India and the EU) have inconsistent production, the import locations are not well defined. On the other hand, certain countries have been very consistent exporters (Bain, 2013). As a result, both global sugar contracts are delivered FOB in exporting countries' ports. The white sugar contract can be delivered in no less than forty-one countries spread across all regions of the world. The Sugar No. 11 contract is delivered in ports of the country of origin (or in the case of landlocked countries, at a berth or anchorage in the customary port of export). There are twenty-nine eligible growths, essentially in cane growing areas of Africa, South America and the Pacific. White sugar does not have this issue of deliverable growth, as white sugar is an undifferentiated product.

This issue is more complex for coffee. For arabica coffee, twenty growths are eligible for delivery, but only twelve of those are at par with the price of the contract.[131] Colombian coffee will be delivered at a premium while the remaining seven countries

[131] Like other contract specifications, the exchange decides premium and discount.

are delivered at various discounts. An additional premium and discount system is applied depending on the grade of coffee delivered and the testing for flavour. Therefore, such a system necessitates the ability to compare all types of the commodity on a single scale, and have a very precise and globally accepted grading system. A premium and discount system is even applied to the various delivery ports to account for freight. While the robusta futures accept any origin, Class 1 Robusta Coffee is deliverable at the contract price and other qualities are delivered at premiums or discounts. The grading system and its attached premium and discount are crucial in a commodity such as coffee. Similar systems were used in other extinct coffee contracts, such as the ones of the Tokyo Grain Exchange and the Singapore Commodity Exchange.[132] If the mechanisms do not assure stakeholders taking delivery of the contract that they will pay a fair price for the coffee they received, they will simply not take part in the delivery, and arbitrage and convergence will not happen.

A fundamental reason why the commodities fit the global contract system is the structure of their markets. As mentioned in the previous chapter, large shares of the commodity produced are exported. Approximately one third of the global sugar production and three quarters of the global coffee production are exported by a variety of countries to a variety of importers. Since most grades and growths are deliverable on the contract, they are all included in the price discovery mechanisms of the futures contracts and can therefore be reliably used for pricing or hedging any type of coffee or sugar. Thus, any sophisticated actor can use a contract that will suit their needs.

The international contract and the global benchmark models presented are both imperfect fits for the rice market. It is already possible to see differences in terms of liquidity and market integration in the case of the global benchmark, and a lack of international trading and grading system when it comes to rice. However, in the following sections I explore whether these issues can be, to some extent, overcome to create financial development at the global level.

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[132] Those contracts were discontinued following the M&A of the commodity exchanges hosting them.

II) A Global contract for rice?

The question is whether a global contract for rice can be built by applying one of these two models. There are cases to examine what has been done or not to build such a contract. This section explores the option of an international contract. This has been attempted at the London Fox in the 1990s and has been reconsidered in 2012 during an expert meeting group in Singapore. However, the first attempt resulted in failure, while the other was dismissed as it was not deemed feasible. I argue that the obstacles to the standardisation of the grain and the establishment of delivery mechanisms are such that replicating this model from soft commodities is not currently a viable option.

a. The failure of the London Fox Experiment in Rice

In the early 1990s, the London Futures and Options Exchange (Fox) attempted to launch a new kind of rice contract (Latham, 1998). All previous rice futures contracts had been for a single origin, local to the country where the exchange was found. The delivery points were also in the same country. The London Fox came up with a whole new logic of trading Thai 100% grade B rice, with seller's option to deliver US rice grade #2, 4% broken (at 5% premium). Together, these varieties represented a standard for high quality internationally traded long-grain rice (mostly destined for export to rich Western markets). However, the contract did not exactly intend to combine two markets in one. Instead, the deliverability of US rice was put in place to ensure that in case of a scarcity of supply for Thai rice in Kohsichang,[133] the convergence through delivery arbitrage would still take place. However, the international aspect of the contract was still demonstrated by the use of US Dollars, the specification of milled rice and its delivery on vessels in international ports.

The contract failed to attract liquidity. Despite the participation of some international traders such as Sucden and Louis Dreyfus, as well as few local traders, the exchange did not manage to convince other market actors in Thailand and the US such as Continental and Uncle Ben's (Roche, 1992). The London Fox is a complex case because it is not only the story of an unsuccessful contract; it is also the story of a failing exchange. Therefore, there is nothing obviously separating what was the result

[133] The island Kohsichang serves as the deepwater port for Bangkok, where the contract specified delivery.

of mistakes in building the contract, structural market issues or and what was the result of the exchange operation.

London Fox Rice Contract Specifications	
Contract Unit	50 tonnes
Price Basis	US Dollars and cents per tonne FOB (Kohsichang) or FAS (Houston, Lake Charles, Now Orleans) FAS at 5% premium
Minimum Price Fluctuation	US Dollars 0.25 per tonne.
Specification Tenderable	Either Thai 100B rice current crop in 50 kg polypropylene or jute bags with a minimum delivery of 500 tonnes (or a penalty of $2000 payable) or at a 5% premium at sellers' option, US 2/4 rice delivered similarly.
Trading Positions	October, December, March, May, July. Seven months always quoted.
Trading hours	09.00 – 18.00 hours or as decided by the Market Committee.

Table 9: Specifications of the London Fox Rice contract

The London Commodity Exchange (LCE) was founded in 1954 and hosted trading in soft commodities during most of the second half of the 20th century. In 1986, the LCE, formerly a trade association, was demutualised and renamed London Fox in June 1987 (The New York Times, 1987; Spence, 1992). The 1990s were a time of optimism about the globalisation of exchanges, but there was also of fierce competition between those exchanges. Consequently, the London Fox was like many other exchanges – it lead a policy of fast expansion, materialised by the launching of many new contracts.

In 1990, the London Fox's CEO, Mark Blundell, appointed a friend of his, Julian Roche, as business development manager. Roche was then 29 years old and inexperienced with commodities. The logic behind his recruitment was that Blundell wanted to create a real estate futures based on a property index, and Roche knew about indices. He was not only given the responsibility to launch the real estate contract but was also asked to develop other contracts: rice and cotton.

The exchange did not follow the best practice for how a futures contract should be launched. Usually, the exchange to assembles a committee from the industry and gets a consensus on the optimal contract specifications to attract liquidity. This did not happen with the London Fox contract, as Julian Roche told me:

> *"The London Fox absolutely did not do that when it came to launching its rice contracts. What it did is that the chief executive, Mark, who was a very unconventional chief executive to say the very least, just said: "right, we're going to launch a rice contract Julian. Here you are, go and launch it". So the question about whether it was a sensible thing to do to launch the rice contract and whether the rice contract would succeed or not – and all the usual rational criteria that ought to have underlined whether the contract would be launched at all – just simply didn't apply. Mark's logic, which was deeply flawed, was that with the introduction of electronic trading – which you have to remember was brand new at that point – because terminals were very cheap and you could get as many contracts as you wanted to on the same terminal, you may as well launch a hundred contracts. I remember Mark famously saying, "launch a hundred contracts, throw them all on the wall, some will stick, and that will be great". Of course, this approach to launching futures contracts has now been comprehensively discredited."*

This is not only Julian Roche's recollection of the events. For instance, The Independent, when reviewing a tough beginning of the decade for the exchange in 1992, found that: "the root of the exchange's problems have been [sic] diagnosed as bad business strategy … A spend, spend, spend approach to improving business led the exchange to create a huge marketing budget and throw money into dubious new contracts which had doubtful backing from members" (Vaughan, 1992).

The failure of the London Fox rice contract is partly rooted in the misunderstanding of the technological change brought by electronic trading. The exchange was using an Australian computer trading system called FAST (Roche, 1995). FAST terminals could display a maximum of four screens. Brokers would usually hold four licences for cocoa, coffee, raw sugar and white sugar, leaving no space for an additional contract. *"To trade anything new, you would need a new fast screen that would mean a new subscription to the exchange, and a new employee",* Roche told me. That appeared to be an issue for all the new London Fox contracts.

Although the contract had not shown promises in its first year of existence, it is important to remember that some contracts simply have a slow start. Chapter III mentioned that some contracts slowly pick up before suddenly attracting enthusiasm. However, in 1991, the last hope to see the rice contract succeed was erased. The development of the Fox rice contract suffered from fraud committed by exchange officials. The property contracts for which Roche had been recruited, had been launched in May 1991. Blundell expected that these futures would be the ones bringing the exchange prosperity, so the FOX invested heavily in this project (Bray N. , 1991). For various reasons, including the same issue of FAST terminals, the property contracts failed to attract liquidity and the volumes traded started to severely drop from August 1991. The property contracts never turned into the boost expected for the exchange. Facing this ongoing failure, Blundell "initiated" a market manipulation: the exchange started trading its own contract "in the hope that the illusion of liquidity would draw investors from outside" (The Economist, 1991). The strategy to lure investors was uncovered by regulators at the beginning of October 1991. The London FOX chairman, as well as Mark Blundell, subsequently resigned on the 5th of October (The Economist, 1991; Bray N. , 1991).

Figure 17: Trading volumes of London FOX Real Estates Contracts (Source: The Economist)

The confidence of exchange participants dropped as a result and many withdrew. Although all commodities were affected, the ones with the smallest liquidity were logically the first to suffer. In the summer of 1991, no rice contracts were traded, while the volumes were up to five contracts traded in September of that year (Bray, 1991). While five contracts might have been enough to encourage the continuation of the contract early in its life, it remained an illiquid contract before the scandal and the turn of events put an end to any hope of late blooming success. At the time, it was unclear whether rice was directly affected by manipulations. Immediate coverage of the events by The Economist and The Wall Street Journal suggested that the exchange may have traded rice contracts (The Economist, 1991; Bray N. , 1991). However, the Independent mentioned only the property futures in late 1992, and Roche heavily insisted, when I interviewed him, that the exchange never traded its rice contract (Vaughan, 1992). The absence of significant traded volumes tends to confirm this version. In any case, this casted doubts about the fairness of the contract for many participants and brought the project to its end.

Roche argued, both in his book and during the interview, that the issue was not to do with the specifications of the contract itself (Roche, 1992). Instead, he mentioned the traditional issues presented in previous chapters: the market opacity kept market participants away as they aimed at protecting information asymmetry, and the catch 22 – the lack of market makers prevented attracting further participation. However, he also thinks that the project was feasible, simply not on London Fox[134]. Many arguments developed in the previous chapter – such as opacity and the lack of willing sophisticated actors – cast doubts about that feasibility, but the London Fox was particularly unequipped to lead the project. If there was, indeed, a narrow opportunity of establishing an international contract, the rice industry missed a rare chanceof achieving it. As the project was mismanaged, the London Fox case did not confirm whether these obstacles could be overcome with the international contract model. However, the experiment allowed me to discuss with Julian Roche what sort of lessons could be learnt, despite this failure.

b. Lessons from an international contract

In this section, I review the lessons from the London Fox and compare them, when applicable, with the conclusions of the Singapore Expert Working group of 2012. This allows me to observe potential changes or stagnations in the market two decades later. I used the interview from Julian Roche and his book to reflect upon the London Fox and explore the position papers and reports written before and after the Singapore

[134] See following sub-section.

working group. I also, use the recollection of my interviewees who were present at that meeting, especially Sally Trethewie.[135]

A consensus regarding the existing prerequisites for a functioning global futures market in rice is that the market must present the necessary level of volatility in prices (McKenzie A. , 2012). In both cases, there was indeed some risk to trade. However, another consensus is that the market does not lend itself to standardisation. An issue for an international rice contract is that it needs to be based upon what is traded internationally: milled rice. As a result, constructing a contract upon paddy was not possible. Milled rice is a highly diversified commodity. A first issue encountered by the rice market is the lack of grading standards to classify the diversity of varieties and qualities at the international level (McKenzie A. , 2012). Each country uses widely different grading systems, and the inspections of these grades are not systematically done in many of the producing countries. In addition to the problem of standardization that could eventually be overcome, lies the more complex problem of integration. Roche reflected on how prices of different grades of rice tend to diverge. It is not only the price of different grades that are not integrated but also the price of different origins. McKenzie (2012) looked at the hedging effectiveness for Southeast Asian rice of a hypothetical futures contract for Thai 5% WR FOB. He found that it would be effective for two other Thai grades and to a lesser extent Vietnamese 5% FOB, but not for the 13 other grades and origins he tested. “In other words, a lack of price correlation renders the hedge ineffective” (McKenzie A. , 2012, p. 34). This makes difficult the instauration of a premium and discount system for rice and turns down the possibility of seeing the delivery of different grades and origins in various ports. The added lack of reference benchmark price of a single widely traded variety seems to mean that the rice market has little prospect of producing an international contract that would be widely used by most international traders (RSIS Centre for Non Traditional Security (NTS) Studies, 2012).

Despite that, it seems that many market actors (traders, market analysts and derivative finance professionals) are enthusiastic about the idea of a contract for internationally

[135] Sally Trethewie was, at the time, in charge of organising and coordinating the meeting in her position as Senior Analyst at the RSIS Centre for Non-Traditional Security (NTS) Studies. I interviewed her in Edinburgh, UK, in April 2018.

traded rice. However, in the absence of correlation, only international trading companies, Thai exporters, and, to a small extent, potential Vietnamese exporters, would be likely to trade the contract as commercials. The thinness of the international market had come up consistently in my interviewees' explanation for the absence of rice futures contracts. As mentioned in Chapter I, only 7-9% of rice is traded internationally. A large share of this is done through Government to Government trade. If other major origins such as India, Pakistan and the US are removed from the picture, only an even thinner market is left to trade upon. With such a prospect, there has been no questioning in the literature or my interviews about whether such a contract should be based upon delivery in Bangkok for a higher quality of rice (McKenzie A. , 2012).[136] The futures would effectively not be a contract for internationally traded rice but Southeast Asian exports instead. The thinness of the physical market was one reason listed in Chapter II for the failures of futures contracts. However, while recognising this fact, both Julian Roche and the Singapore Expert working group noted that a small futures market could still function, and profit market actors through its hedging and information function. Taking the CBOT contract as an example, it was argued that what matters is having a functioning contract to work from before moving towards broader market integration (RSIS Centre for Non Traditional Security (NTS) Studies, 2012). They imagine financial development taking place and contributing to market integration, instead of depending on it.

If the contract were to specify delivery in Bangkok, the question remains where it should be traded. Roche (1992) argued that a local futures exchange in Thailand could not host the contract because it would not provide enough speculative liquidity. The London Fox picked up on the opportunity as its pool of speculators could be injected into the market. However, the exchange faced other issues, especially its lack of resources necessary for the development of the contract:

> *SL: Could you have expected the contract to survive, was that the objective?*
>
> *JR: I think so. With the right preparation and the right conditions, and stationing somebody in Bangkok. … Now if somebody had said to me in 1991 "hey Julian move to Bangkok", my answer would simply have been "no". It was no*

[136] In the 1990s, the people consulted by the London Fox pushed for Thai 100% Grade B. However, over the last decade, the consensus of the market seems to settle upon Thai 5% WR.

suggestion of anybody going out there to do that. Maybe by the end of 1991 I would have been willing to do it, but by that time the exchange had run out of money and then it had the property futures scandal … So, it was never a possibility of any of those things to actually happen.

Roche explained to me that such a person on the ground would have been responsible for trying to mobilise liquidity there. The tasks would have included publishing newsletter, getting local brokers to join the London Fox, organising brokers trips to sign up trading partners to get the Thais themselves to become members. The job would also have involved negotiating with the Thai government to get the fast terminals installed in Thailand. None of this, of course, ever happened:

"That was well beyond the thinking of anyone in London Fox. The idea that London Fox would send somebody out and pay for somebody in Thailand on a UK wage, £40k a year – at that time quite a lot of money – to work exclusively on the rice contract that was never going to do little more than a few hundred to a thousand contracts at best, it just didn't match. The required resources to do the job did not match at that time. Remember we're talking pre-internet days."

At the time, four exchanges had the resources to consider such a Thai rice contract, but according to Roche, all had reasons not to go forward with the project. CBOT did not want to create competition with its own rough rice contract[137]. CME was not yet involved in soft commodities and grains. The Japanese exchanges probably did not want to venture into Thailand, while ASX, the Australian exchange, was not interested in commodities apart from wool.

Twenty years later, the consensus was that such a contract should be based in a Singapore exchange. The financial hub of Southeast Asia had all the infrastructures in place to host the contract and hosted both a large pool of speculators and the regional offices of many international trading companies (RSIS Centre for Non Traditional Security (NTS) Studies, 2012). Sally Trethewie emphasised that no one during the meeting expressed any doubt on the choice of Singapore as a host. However, the question of the Singapore-based exchanges being interested in setting

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[137] See below.

up such a contract is not so straight forward. In 2012, the Singapore Exchange (SGX) and the Singapore Mercantile Exchange (SMX) both sent representatives to the meeting[138]. The two exchanges, especially SGX, were confident in their technical ability to host and implement a rice contract despite some technical issues raised during the meeting. However, they showed little enthusiasm for doing so due to certain reserve on the probability of success, judging from the scepticism of many market participants and the structure of the cash market (McKenzie A. , 2012). In contrast to other situations discussed previously, where the exchanges were the primary movers, in this case, they wanted the impetus to come exclusively from the market stakeholders. *"They [the exchanges] did not feel as if they were the ones to be the champion of it",* Sally Trethewie said. They would have eventually listed a contract that had been designed by the industry but did not want to invest in the research and development necessary. As seen in the case of the London Fox, such a contract necessitates a significant amount of resources. As exchanges do not believe it could be lucrative, the investment is not justified in their eyes. As the chances of success are perceived as low, the model of international contracts with delivery is therefore unlikely to be attempted.

c. The Chicago rough rice contract: not meant to be a benchmark?

If instead, a system of a global benchmark (similar to the wheat market) was to be established, it would have to be done upon the most consistently liquid rice futures, in this case, the CBOT rough trice contract. Many of the millers and farmers I met in Louisiana, who don't use this contract, pointed out the same issue. They believed CME should work on generating liquidity from abroad before they get involved in the market, creating a new catch 22. While Chapter III examined the case of the CBOT in the context of the US rice industry, this section questions its role within a wider international spectrum, and investigates why the Chicago rice futures have not globalised.

Market participants in Chicago were broadly unanimous that the current contract is not made to attract liquidity from Asia. The lack of integration of local markets at the international level is an obstacle that most brokers, analysts and contract developers

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[138] It should be noted that Singapore exchanges were hardly involved in agricultural commodities, with only a robusta coffee contract hosted by SGX.

believe this contract cannot overcome. Two main issues drive this lack of integration. Farm programmes around the world segment the market into national entities with their own price logic and partially remove the need for hedging. As mentioned previously, the fragmentation of the market into many varieties and qualities make it difficult to evaluate the basis. Arguably wheat has overcome this issue but rice ads more complexity due to the way it is consumed. Wheat is mainly processed into a few types of flour, for which quality plays a minor part. Its origin is also of little importance - only the variety fundamentally matters. Rice, as it is used for human consumption as a differentiated product, has an important dimension of quality specification added to it. Scott Minton, the CME rice futures broker, started the list of what can come into play when identifying a certain type of rice: *"the taste, the length of it, the translucence, whatever…"*. As previously stated in the introduction to this thesis, there are in fact are about twenty criteria to rate rice on after milling (see appendix A).

Over some periods, Asian and American prices eventually correlate. That happens, for instance, during global shocks such as the 2008 crisis, or when a Middle Eastern country calls public tenders for rice where both hemispheres can compete. In those cases, the CME gets a little open interests from Asia "*and we're very happy when that happens*", Fred Seamon said. But this correlation does not hold in the long term. The design of the contract, its use of American paddy as the underlying crop, makes it isolated from Asian influence. Most of the paddy is processed into milled rice that is consumed on the US market itself, or other markets, essentially in Latin America, where Asian origins do not compete for market shares.

It may be a good thing for the liquidity of this contract to minimise the correlation with Asian prices. The market could lose speculative liquidity if the market had major exposure to political risk. However, even if Asia is not targeted to be covered by the contract, the debate remains about to what extent this futures can be a Pan-American contract. Jack Scoville, a Chicago based agricultural commodity broker, was the most optimistic about reaching new markets in Latin America. He suspected some Mexican market participants of using the contract. Most importantly, he mentioned having been contacted by a woman working for a Brazilian public organisation who wanted to find out about futures, including rice. Brazil uses the CME futures to finance certain public price schemes for producers but cannot apply it to rice *"because the liquidity really isn't there".* An interesting question was to what extent using the rice futures in the three major South American exporting markets is practically feasible. I asked Jack Scoville if we could imagine Uruguayan producers hedging against American futures contracts or if the spread was too unstable for that. He answered:

> *JS: We could, and I think the spreads would not be all that unstable; it's not something they don't know how to do. And the reason why I can say that is because I do have some Brazilian clients and some clients from Argentina, nobody from Uruguay per se, but the whole region, for corn and soybeans, and I do a lot of pricing for them. They don't necessarily hedge, but in Brazil, if you look at the Brazil export contract that is promoted by the government and the exporter associations, they are basically basis contract. And they're based against Chicago. So, they know how to make that work. It's a little counter-seasonal because their growing season is the opposite of ours. But they know how to make those spreads work for them. … They do that in the beans, they do that in the corn, they should be able to do it in rice.*
>
> *SL: But they don't?*
>
> *JS: I don't see it. Not through me, and probably not at all because our market is not really there to do it. But yes, it could be done."*

Jack Scoville was describing a complicated case: according to our definition, South American markets are financially developed. Market participants who trade in a variety of commodities know how to use American futures contracts and can be considered sufficiently sophisticated. The market structure is sophisticated due to the existence of the rough rice contract that South American traders are free to engage in. In theoretical terms, there is the ability to trade risk on these markets. However, in practice, this ability is not used. This fact is even more puzzling when one considers that within South American rice exports (Brazil, Argentina and Uruguay), there is a large share of paddy. They often sell paddy in other Latin American nations, which is later milled in those importing countries.

	Total Rice Exports (MTS)	Paddy Rice Exports (MTS)	Ratio
2017	870268	100172	11.5%
2016	935085	190911	20.4%
2015	1308622	219422	16.8%
2014	1242655	263497	21.2%

Table 10 : Brazilian Rice Exports (Source: Instituto Rio Grandense de Arroz, UN Comtrade Database)

The sentiment coming from the South American market is that the price integration is not the fundamental issue, but that they did not want to use an illiquid market. Exporters cannot see any reason why they should be the ones producing the liquidity in the contract while stakeholders from the US could later benefit from the sudden inflow of liquidity. The catch 22 that exists within the US market is just enlarged to the whole western hemisphere. Therefore, the Chicago Rough Rice contract is unlikely to become an international contract unless it manages to attract more liquidity domestically.

III) The emergence of swaps in Europe for Asian markets and the case of wheat.

The difficulties exposed so far in this chapter could suggest that the prospect of seeing the rice market develop financially at the international level in the near future is doomed. However, a dynamic born in Europe over the last decade for wheat proposes a new pathway for the sophistication of the market structure: the introduction of swaps by brokerage houses that are later converted into index-based futures by exchanges have gained traction in both markets.

A swaps transaction consists of engaging in a forward contract but settling this contract financially upon an index. The two counterparties will agree on a fixed price when signing the contract. At expiration, the index provides a settlement price (often called floating price). In commodities, it is usually the arithmetic average of all the daily price assessment of the index in the delivery month. The long position will pay the difference between the fixed price and the settlement price to the short if the settlement price is below the fixed price or vice versa. For instance, if a producer enters a swap transaction with any counterpart for a fixed price of $400 per tonne and that the settlement price is $380, the counterpart will pay $20 to the producer. The producer should sell the commodity for approximately $380 on the cash market and have a total revenue close to the value of the fixed price as a result (Pochara, 2012).

With the slow reversal of the wheat market towards the Black Sea, as explained in Chapter IV, the wheat industry, as well as the derivatives industry, had to adapt. For a long time, like other origins in the world, Black Sea Wheat was hedged on CBOT or Matif, in France. However, those markets did not always guarantee correlation for wheat from the Black Sea, as many interviewees reported. It appeared that this area of the world could benefit from its own futures contract. As a result, CME introduced a deliverable Black Sea Wheat futures in 2012. It failed to attract liquidity and was withdrawn in March 2019 (Trompiz & Parent, 2018; CME Group (a), 2019). According to Swithun Still, a Black Sea grain trader, this failure was due to the contract being deliverable in four ports in Ukraine, three ports in Russia and one port in Romania (CME Group (a), 2017). This created an unclear pricing structure preventing stakeholders from taking delivery of the contract. However, the maturity of the industry was also blamed for the failure. According to the Financial Times:

> The historical reasons for the lack of derivative trading in Black Sea grains are multifold. On top of geopolitical concerns, Ukrainian and Russian authorities have a record of political interventions in the grains markets, and there have long been concerns about Ukrainian and Russian sellers defaulting on agreements.
>
> A simple lack of knowledge about futures markets among buyers and sellers in the region as well as specification and logistical issues have also hampered derivative transactions (Terazono, 2017).

These issues appear very similar to many presented throughout thesis for rice. While it could not generate liquidity in its deliverable contract, CME successfully overcame the challenge of developing the Black Sea Wheat market financially with an index-based contract. This was not the achievement of CME alone but a multitude of industry stakeholders over half a decade.

Back in 2012, a price-reporting agency, Platts, the leading benchmark in the energy and metals markets, acquired Kingsman, a sugar reporting company (S&P Global Platts, 2016). As a result, Platts entered the agricultural markets and its grain division launched a daily assessment for Black Sea Wheat in 2014 (S&P Global Platts, 2019).

It specifically prices 12.5% protein Russian wheat, FOB in Novorossiysk. The following year, it replicated the move with an assessment for APW (Australian Premium White) Wheat FOB Australia (S&P Global Platts, 2015). Platts managers started to talk to brokers on the market to suggest using their indices as underlying pricing mechanisms for swaps. Brokers answered negatively due to the size of the challenge, until one of them, a Singapore based broker who worked for SCB Brokers and was experienced in swaps for palm oil, took on the idea. He succeeded in his attempt and in November 2016, Louis Dreyfus and Cargill traded a swap on 5,000 MTS of Australian wheat. The contract was to be settled against APW FOB Australia price assessment of the newly renamed S&P Global Platts (Hall, 2016). This remained only a one-time deal for the Australian wheat market. However, SCB decided to replicate the contracts for Russian wheat. In March 2017, they facilitated the first deal for Black Sea Wheat between two Swiss-based grain trading companies: Ameropa and Solaris (S&P Global Platts, 2017). International traders welcomed the opportunity to manage their risk and SCB started brokering such contracts more often, with five or six regular counterparts. Soon, CME saw an opportunity and picked up the project. The swaps contract was standardised and turned into a publicly listed cash-settled futures, with Platts remaining the underlying index. It launched in December 2017 (CME Group (b), 2017). CME introduced it on its two trading platforms: Globex, its electronic trading platform that matches bids and offers, and Clearport, its clearing service for OTC markets where privately negotiated trades can be reported by brokers and added to the price discovery and clearing mechanisms (CME Group (b), 2019). According to a broker, most of the volume of the Black Sea Wheat Contract is produced through Clearport. While at first, an independent OTC market coexisted alongside the CME system, it soon disappeared as contracts can be negotiated privately before using the CME clearing house as a guarantor for the trade. The contract is thus a mix of the swaps and futures system.

These types of futures contracts attracted participants' interest because of their simplified settlement. There is no need for arbitrage during the delivery month to obtain coherent prices: the final settlement price is determined by the index instead of the mechanisms of physical delivery. In addition, there is no risk of being caught in the delivery month for participants who cannot make and take delivery. Instead, they stay in the market until the expiration of the contract. This also implies that participants are not afraid to participate in the contract when it is not yet liquid. They have no risk of being unable to pass a cancelling trade before the delivery month, which necessitates the availability of a counterpart for this trade.

The contract succeeded in attracting large trading volumes that even allowed the CME to launch options upon its contract, generating further liquidity (see Figure 18) (Trompiz & Parent, 2018; S&P Global Platts, 2019). During the first few months, Solaris and Ameropa generated almost all the liquidity. Soon, more hedgers – primarily from Ukraine – and speculative funds started trading the contract. Within three years, the sophistication of the market structure had been achieved in a region that was unfit for traditional futures markets. To a lesser extent, the CME has also succeeded with its Black Sea Corn contract, based on Platts assessment of Ukrainian corn. This was launched simultaneously with the Black Sea Wheat contract. However, it failed to attract regular volumes and open interest in its Australian Wheat contract launched in June 2017 and the reporting of the company on this contract had become scarce in the second half of 2019. Therefore, one should be careful of seeing index-based futures as a guaranteed solution to sophisticate the market structures of markets that are previously financially underdeveloped.

Soon after the launch of the wheat swaps by SCB, the idea of replicating the method for rice grew in the mind of certain market participants in Europe. The idea of having an index-based derivative was not completely new. It had been discussed in Singapore in 2012 but the absence of a well-established index at the time made this option impossible. Many participants of the working group were calling for an expert and well-established body to create such an index but believed it would be difficult to do so (McKenzie A. , 2012; Pochara, 2012). Julian Roche had himself thought about a cash-settled contract in the 1990s, but the market did not have a reliable index to work upon either, so the exchange would have had to establish one itself. That was not possible within the time frame allocated to him. *“Look at the organisation you worked for, look at the efforts that went into that, imagine an exchange doing that. It would be deadweight capital cost. An exchange has to piggyback off an index, not the other way around”.* When mentioning the organisation I worked for, Roche was referring to the LiveRiceIndex (LRI), which was established in 2012 and grew from there.

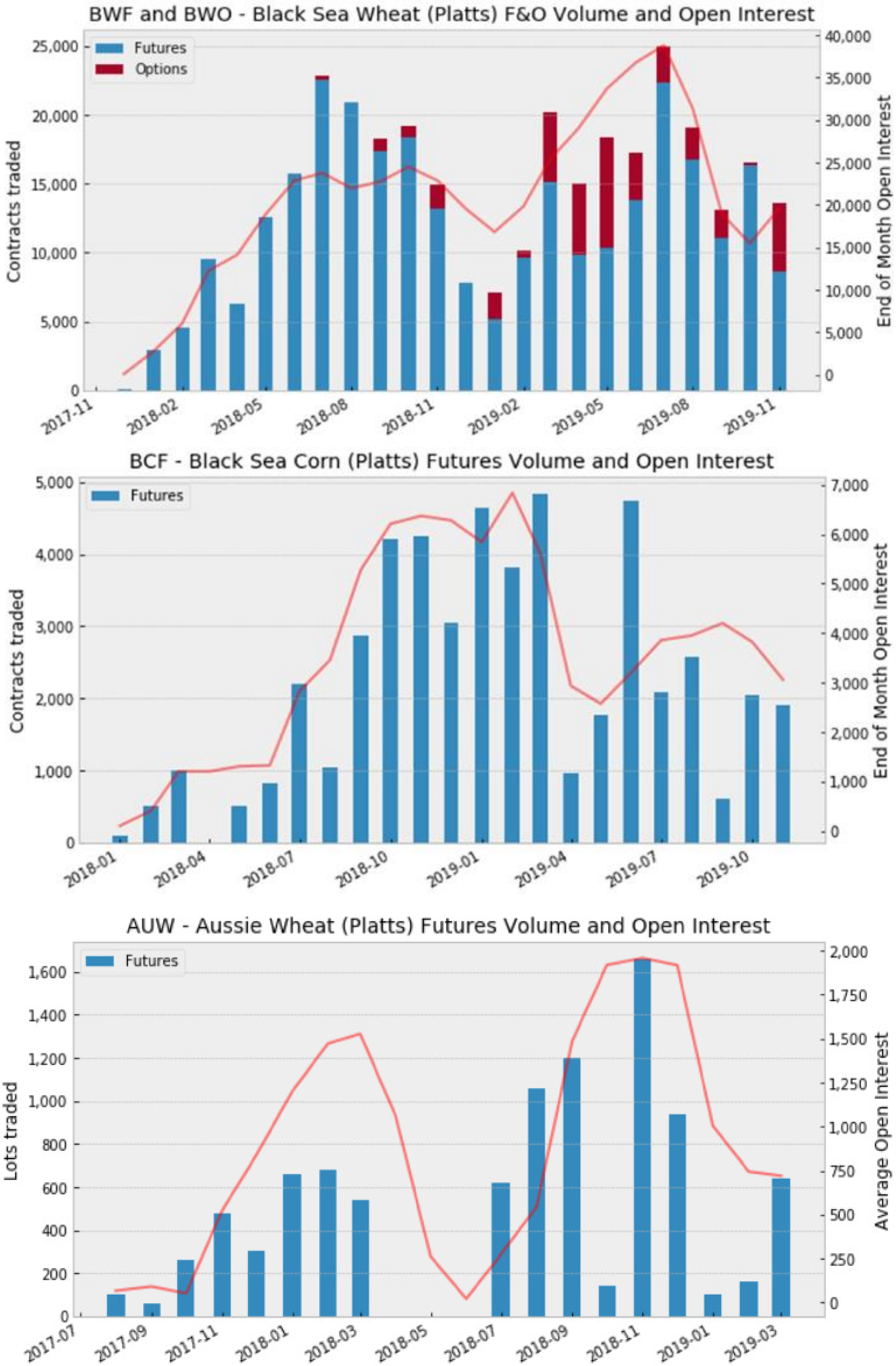

Figure 18: Volume and OI of CME Index Contracts (Source: CME Group)

In 2016, just as wheat benefited from Platts, rice could rely on price assessments provided by the LRI. A UK-based brokerage firm, Jackson Son & Co. had started reflecting on swaps contracts even before the wheat market took the initiative. At the time, the company was made of two divisions: rice and oil. From discussions between the two departments, it appeared that the rice market was lacking the sort of forward pricing and hedging solutions found in oil and that an OTC swaps contract was the way forward. In 2017, Jackson launched it swaps project based on LRI assessments for Thai LG WR 5% Broken, Thai LG Parboiled 100% STX, and Pakistan LG WR 5% Broken, while also exploring the possibility to attract interest for Thai Hom Mali rice as well as Indian and Vietnamese rice. One of the arguments advanced by Ben Savage, a broker at Jackson, in favour of these types of contracts, is the flexibility in term of varieties covered. The ability to trade the needed variety through OTC derivatives appeared as a solution to the lack of price integration between varieties. In addition, speculators could trade the spread between two origins, generating more liquidity. The following year, after their successes on the wheat market, SCB stepped in the rice market too. It traded its first rice swap in February 2019. “The trade, based on the Live Rice Index was a swap based on price for Thai white rice, 5% broken. … The transaction took place between a Thai-based rice exporter and a Singapore-based rice trader” (SCB Group, 2019).

In May 2019, I was invited to join the conference LIVE2019 organised by the LRI to discuss the prospect of seeing the market expand. It gave room for the two brokerage companies to present their new products and the potential developments for the futures. It took place in the presence of representatives of both CME and ICE, both of which showed interest in listing those contracts as futures on their exchange. However, the OTC market first demonstrating the ability to attract liquidity is still a condition for their involvement. At the conference, one of the many issues discussed was the important counterparty risk presented in chapter VI. The market could find a new catch 22: participants wait for the guarantees brought by an exchange's clearinghouse to be involved, but exchanges want to see participation in the OTC market to be convinced to list the contract. In August 2019, I interviewed a Thai exporter[139] using the rice swaps for hedging. It was difficult for them to find a

[139] Interview with an anonymous Thai rice miller, trader and export, Thailand, July 2018.

counterpart. *"It is a small market; there are not many people ready to play with it. You have to find the people who can match".* Even when trades are concluded, the exporter confessed that the participants' cautiousness led to very small volumes being contracted, only two or three months before delivery. The issues of transparency and political risk discussed in previous chapters mean that counterparties are still reluctant to forecast market dynamics.

Another issue is that such contracts are based on indices. Some industry participants like to present this as the perfect solution, but it can also be a disadvantage. Just as stakeholders can lack trust in the convergence for a deliverable contract, some can lack trust in the underlying index. The LRI has been generally trusted and praised for its improvement over the years as well as for its transparent methodology. It has been widely used for spot market information, as an indication of the ongoing prices. However, serving as the reference for a contract necessitates extremely precise pricing. The LRI is one of the rare companies concentrating the largest amount of rice data to determine its prices. Yet, it does not stop some market actors to doubt the index's reliability. Some traders and exporters believe that they sometimes see prices that are not in sync with the index and that the index must thus be wrong. The other worry from market participants, when it comes to indices, is the risk of their manipulation. They fear that once the market becomes an instrument used for price settlement, there would be more incentive for market stakeholders to share incorrect trading prices with the PRA, if that benefits their own positions in the contract. Therefore, to see such a contract succeed, there needs to be a high level of trust in the index from the market. The acquisition of the LRI by S&P Global Platts – announced in September 2019 – is likely to lift many doubts upon the reliability and impartiality of the index, as it benefits from the reputation of its new mother company that has successfully provided benchmarks for energy and agricultural contracts (S&P Global Platts (2), 2019). This is the same reputation that allowed the Black Sea wheat contract, when it was launched, to not meet the scepticism of market participants regarding the underlying index.

Despite the fact that trading in the OTC swaps remains small, CME announced in October 2020 that it would launch a Platts based Thai 5% WR futures on the 23rd of November of that year. The exchange managers seemed to have acknowledge the limited scope for the swaps to attract liquidity without counterparty guarantees. Only time will tell whether this contract will succeed. It benefits from the end of delivery issues avoiding a potential catch 22 similar to the rough rice contract. The contract will not increase transparency far beyond what the LRI and other rice intelligence companies already do. Thai exporters and international trading houses could therefore show less reluctance to join the market. However, market participants acknowledge that CME will need to provide a great deal of education seminars to enhance the sophistication of actors. The politicization of the crop will remain an obstacle but if the interventions in Thailand remain low, as they have been since the fall of the PTP, the market may have time to develop financially around its Thai white rice benchmark.

VI) Discussion

In previous Chapter through this thesis, I have many times insisted on the role of market actors in the potential of a market to develop financially. The validity of that argument should not overshadow the fact that the rice market has deeply entrenched characteristics that would always present a challenge to its financial development. In a – very – hypothetical scenario where contract engineers shall find a consensus for traders to support their project, and that politicians were willing to step back from intervening on the rice market, difficulties in building a global contract would still exist. The lack of global integration of rice prices and the multiplicity of varieties suiting different taste mean that rice has little prospect of financialization in a similar way to wheat, sugar and coffee. Following the arguments developed in this chapter, I propose that the use of the term rice market is somehow misleading. It would sometimes be more useful to discuss rice markets, with a 's', as the industry shares actors and practices, but is animated by a multiplicity of supply and demand balances, resulting in a wide range of often uncorrelated prices. If the rice market is to develop financially, eventually through new models of contract such as swap, it will probably be in the realm of a restricted part of the industry, the export market for high grade White Rice from Southeast Asia. If that was to happen, it would already represent a profound transformation for the market.

Despite arguing that this Chapter re-establishes the importance of the physical market structure in its propensity to financialize, I have once again awarded individuals a great deal of importance in the process. In particular, contract developers hold some of the keys of financial development. Whether they are brokers or work for an exchange, they have the ability to innovate and adapt to the reality of the challenging market structure. This is what happened with the Black Sea wheat contract. However, their failure to deliver well-engineered contracts can result in the wrongful perception that they failed because no one could succeed. This comforts one last time the idea that the study of financial development should include a great deal of study of individuals.

IV) Conclusion

The prospects of seeing rice replicate the old global contract models (global benchmarks in wheat and international contracts in coffee and sugar) seem limited. The lack of liquidity of the CBOT means that it is unlikely to be used as a hedging instrument across the American continent. The case of the London Fox has been affected by too many external factors related to the exchange itself to conclude that an international contract for rice has already been attempted and failed. However, the lessons regarding the limitations of such a project seem to persist through time, as was demonstrated in Singapore in 2012. The multiplicity of uncorrelated varieties and origins of rice in an already thin international market means that an exchange could not concentrate the world trade into a single futures. Instead, it would be possible to create a deliverable contract for the Thai export market. However, such a contract is unlikely to be liquid enough to justify the investment by a commodity exchange. Instead, many European actors of the rice market hope to be able to replicate the success of the Black Sea Wheat swaps market that has been turned into an index-based futures market.

This chapter also confirmed the importance of market structure and geography in the construction of financial development. Contract designers need to adapt to the specificities of each market regarding the way they are globalised. Coffee is ultimately a global good because it is produced and consumed in different countries. This line is more blurry for wheat, which explains why it adopted a different model. This challenges the idea that financial development is an independent dynamic that grows within agricultural markets. It is instead an explicit project that must be well-engineered by its advocates to function smoothly and bring actors around the world within the same contract. The emergence of the swaps model proves that these contract engineers can adapt to the limitation posed by the market structure of some markets. It also suggests that the derivatives industry is entering a new era where the challenge will no longer be to calibrate delivery mechanisms but instead to establish trusted price indices. Putting in place these mechanisms for rice could solve many of the structural problems it faced in its financial development, making an instrument available for its few sophisticated actors. Other issues, especially the politicization, will remain an obstacles to attract large speculative interest, but a listed index-based futures will constitute a first layer of financial development. The rice industry is removing the many barriers to this process one at a time.

Chapter VIII: Conclusion

This thesis has explored the financial development of rice and the compared markets of coffee, sugar and wheat, in order to answer my research question – *what explains the fact that financial development – materialised on commodity markets by the increasing capacity to trade risk through derivative contracts – characterises most food markets but has remained marginal in the rice market?* – and the associated sub-questions. Chapter III to VI, in the light of the theory of contract failure provided by chapter II, theoretically and empirically analysed the hypotheses proposed in the introduction about the reasons behind the underdevelopment of the rice market. In these chapters, I have been able to successively: question the low liquidity of the only well-functioning rice contract despite being hosted in a financially highly developed country, the USA; explore the politicization of the agricultural commodity markets and futures exchanges, and their impact on the financial development; study the patterns of crops' financial development in developing countries; and to explore the building of derivatives market at the global level, including the changing process of financial development through index contracts and its impact on the future of the rice market.

This final chapter concludes from the discussions developed in this thesis and provides answers to the research questions provided in the introduction of this thesis. I begin by questioning to what extent past contract failures teach us about the financial underdevelopment of the rice. Subsequently, I summarise the major arguments explaining why rice did not develop financially and is unlikely to do so through futures contracts. I continue by examining these arguments against my comparative case studies, in turn confirming my findings. After briefly summarising my findings regarding the financial underdevelopment of rice, I terminate this thesis by going beyond the case of rice and propose a final reflection on the contributions of this research to the study of financial development, especially the financial development of agricultural commodities through derivative contracts.

I) Theoretical legacy of the history of rice futures:

I argued in Chapter I that the financial development of a commodity rested in the existence of futures contracts for that commodity. This is because derivative contracts allow the trading of risk, but futures contracts allow the transfer of price risk, outside the market, to speculators. However, rice has been deprived of very liquid futures contracts since the end of WWII, despite successive attempts by various commodity exchanges to list rice futures. This was why I asked the sub-question: do patterns of contract failures appear in the rice market?

To answer this question, I need to go back to the theory built in Chapter II. In line with the argument of Black (1985), I argued that the failure of futures contracts can be due to the specificities of the underlying cash market (these are the so called prerequisites), and the circumstances surrounding the building of this contract. Importantly, I argued that the probability of the contract avoiding unfavourable circumstances, whether it be mistakes in the contract design or inability to build the initial liquidity, is low. Therefore, contracts tend to fail primarily for reasons unrelated to the underlying market. When the contract is victim of *ad hoc* issues, it obstructs the diagnosis of whether the prerequisites were fulfilled. A failure in meeting the prerequisites is only apparent when all other parameters function well.

When I asked whether the history of rice futures held the key to the financial under-development if the commodity, I aimed at examining whether past contracts had failed because of recurrent systemic issues with the market. However, the study of post WWII rice futures contracts in this thesis has instead brought light a variety of *ad hoc* issues that led to the failure of these projects. The New York contract of 1964 and the first New Orleans attempt in 1981 failed because of issues with bag labelling. It illustrated how details in the contract specifications can lead to contract failure. The London FOX in the early 1990s created a contract without the resources to develop it and the exchange was mismanaged, exemplifying the individuals' input in the fate of a contract. The AFET in Thailand was potentially victim to a lack of trust in the regulation system, even before politics came into play. Although the difficulties of the Japan contracts are strongly influenced by politics too, the peculiar approval system for Japanese futures combined with the Fukushima disasters are factors that made this politicization possible. Similar issues could have emerged in the attempt to establish futures contracts for other commodities, and these contracts would have failed in the same fashion. As there is a disproportionate chance for a new futures contract to fail in attracting liquidity, due to circumstantial issues, human errors or impediment, the failure of five exchanges to make their attempts successful, over seven decades, is not enough to prove the structural non-viability of the project. Therefore, these failures have, as expected, obstructed the observation on whether futures for rice could thrive under *normal* circumstances.

The failure of contracts from circumstantial issues seems to make the history of rice futures less valuable because non-generalisable reasons for these failures are at the forefront. However, that is not exactly the case. Firstly, because it did not prevent me from exploring, beyond these issues, whether the market was viable in the first place. Analysing the structural issues around the contracts, such as the politicization of rice in Thailand or the lack of standardisation and correlation in the case of the FOX contract, was possible and gave more context to the rest of the analysis where the prerequisites had to be analysed in a more theoretical way. This was an important contribution as research on commodity futures contracts often bonds its analysis at the *ad hoc* level. Secondly, and most importantly, these failures are not stand-alone events in history. While arguing that they have not proven the infeasibility of the project, I also acknowledge that these failures may have been misinterpreted. It is a common misconception in the industry that the success of a rice contract has been proven impossible by past attempts. As a result, many contract engineers may have been reluctant to make their own attempt, reducing further the probability of rice financially developing through functioning futures contracts.

However, I shall classify this lack of attempt as a minor factor contributing to the financial underdevelopment of rice. Instead, through analysing the underlying market, this thesis has argued that there were fundamental issues that would have prevented the development of futures market, even if one had emerged in an optimal *ad hoc* situation.

II) Reviewing the hypotheses for the low financial development of rice

Although the history of contract failure did not consistently display structural patterns of failure, I have analysed the rice market to understand whether, and to what extent, the factors hypothesised in the introduction had contributed to the low financial development of the rice market. I found that all those factors supressed the potential for risk trading, although to different extents. In this section, I review those hypotheses. This will allow me to compare them to the situations in my comparison markets and later discuss their link to the dynamic of financial underdevelopment.

a. Politicization:

I start with politicization because of all the structural parameters that this thesis has identified as impeding the financial development of rice, it is the most popular explanation in the view of industry actors and previous research (Carter, 2007; Hamilton, 2012; McKenzie A. , 2012; Pochara, 2012; Trethewie (b), 2012). However, these studies, reports and position papers have never attempted to portray, in detail, the mechanisms of politicization, its roots and the effect it has on the financial development of rice. McKenzie (2012) mostly argued that government uncertainty hindered speculation, which I agree with, but it was beyond his scope to explain why. He also failed to acknowledge that some government interventions simply remove the need for hedging.

In the various experiments to establish futures contracts for rice, politicization has manifested itself in all its possible forms discussed in this thesis: through the suppression of risk, the manipulation of price formation, or the direct targeting of futures exchanges themselves. In the US the farm program has been pointed at as a contributing factor to the low liquidity of the CME rough rice contract, although the scope of this programme was not a sufficient stand-alone explanation. Unless price movements are completely supressed, there is always room for risk to be managed through derivative contracts, although the pressure on market participants to hedge is reduced. In Thailand, the heavy manipulation of the market in the 21st century through the rice pledging schemes of the Shinawatra family and their parties removed the need to hedge and ultimately, in the long run, reduced the confidence of derivative participants in the formation of prices in the Thai market. The case of Japan, with both TGE and ODE, has also proven the capability of a government to impede and destabilise a contract through the targeting of the exchange itself to satisfy the clientelism of Japan Agriculture. More importantly, politicization did not only affect rice futures when they were attempted. I argue that the political salience of the crop is such that it casts a permanent doubt upon the viability of derivatives trading in rice. This may have prevented, in the past, other exchanges to even attempt to build a rice contract. Although I used Thailand as main case study for the politicization of the rice market, I explained that this politicization is widespread within the major exporters and importers of rice, reinforcing the political uncertainty. Politicization is likely to once again keep potential market participants from trading the newly introduced Thai 5% WR contract traded at CME from November 2020.

From case to case, these political issues are not isolated from each other. I argued that rice is an abnormally politicized commodity. Its role in the socio-economic system of many developing countries, especially in Asia, makes it politically extra-sensitive. It is the deciding factor of many elections in rice regions. This is because rice is both a food staple and a livelihood within the same political space, making it conducive to unstable politics. Unlike other commodities, governments are also even involved in trading the grain themselves, highlighting its strategic importance. The political salience of rice motivates various political entities to use the crop to achieve other goals, creating unpredictable distortion along the way. All these factors contribute to the lack of trust in the ability to build and maintain a derivatives market coherently linked to the physical trade. When politicization does not stabilise price, which would remove the need for hedging, it makes the modelling of risk too challenging for speculators to embrace derivatives trading for this crop. Therefore, politicization was always going to be an obstacle to the financial development of rice.

b. Market size and fragmentation:

Beyond politicization, which has limited the success of past contracts and affected the potential for financial development, the market structure of the rice market displays patterns that would always limit the liquidity of a newly created contract (Roche, 1992; Latham, 1998; McKenzie A. , 2012). The rice market does not fulfil the prerequisite of a large and homogenous cash market (Sandor, 1973; Brorsen & Fofana, 2001). The lack of integration of different geographical markets and the large number of varieties of rice results in the heavy fragmentation of the industry. The price relationships between different varieties and origins of rice are inconsistent. This discourages the perspective of creating a standardisation system and the use of benchmark against which all types of rice could be priced following premium and discount. It is reinforced by the varying tastes of rice importers and consumers. Thus, they do not value different varieties the same way, meaning that the willingness to pay a premium (or be granted as discount) will mostly depends on the buyer rather than on the type of rice. This also creates separated channels of distribution with buyers consistently procuring from the same supplier. The fragmentation of the industry means that we should not talk about the rice market, but instead about many rice markets, making it harder to establish a large international futures contract. However, the case of the US has proven that even a small market could produce a futures contract suitable for risk trading. Therefore, this factor hinders the spreading of financial development through the industry as a whole rather than making it completely impossible within these small markets.

c. Information:

Through this thesis I have repeatedly highlighted the issue of market opacity in rice, which was already Roche's (1992) main hyptohesis. The lack of easily available information impedes the functioning of futures market in many ways. Firstly, contract managers are deprived of the basic ability to understand the market that would allow them to design the perfect contract and consequently sometimes avoid some of the mistakes made during product development. Secondly, the lack of accessible information to establish futures strategies is an obstacle for market participants, especially for speculators. Finally, and most importantly, the existing opacity benefits the most powerful stakeholders – international grain trading companies and larger local exporters (Gray, 1966; Perloff & Rausser, 1983). Their position in the market allows them to use the lack of price transparency to set up prices and receive extra benefits. This is a disincentive for these actors, who usually display a higher level of sophistication, to take part in futures trading, which would contribute to public price discovery.

Opacity constitutes a major obstacle to the financial development of rice because it not only keeps participants from trading futures, but it even motivates some to sabotage their development. If OTC contracts could function alone, a market could financially develop without creating transparency and therefore attract the participation of sophisticated actors owning an information asymmetry advantage. However, OTC contracts are instead limited in their ability to function without a terminal market.

The peculiarity of opacity is that if the issue can be overcome, futures contribute to transparency and put an end to the advantage held by some market participants who will, then, be likely to become involved in futures trading. The progress in market intelligence and the sharing of information through technology and the development of private pricing firms means that, although this issue has affected financial development in the past, it is less likely to affect rice since the last decade.

d. Developing countries:

The developing countries hypothesis has been confirmed through this thesis. Rice remains a grain traded almost entirely within and between countries of the Global South. Beyond the lack of market integration and transparency issues, which are themselves partly characteristic of developing countries, I argued that the advancement of financial development in countries where rice is prominent as an export or import crop is not sufficient to host a futures exchange. The most important issue was the lack of potential commercial market participants. To generate liquidity in a market, the industry must not be in the hands of very few companies and vertically integrated, as this limits commodity and money transfer between stakeholders and dissipates price risk along the internalised supply chain (Brorsen & Fofana, 2001). This has happened in rice, but mostly in developed countries, with the US and Japanese co-ops. However, in developing countries, the rice market instead consists mostly of many very small entities, rendering large participation unlikely. These small actors cannot afford the cost of participating in futures because of financial cost (such as margin calls) and transition cost, or the cost of financial education. I argued that the large numbers of farmers could not be the main actors of financial development at first. They need to wait for intermediaries to offer OTCs linked to the futures market. However, this issue was not exclusive to developing countries as most US rice farmers also lacked, to some extent, sophistication. Similarly, while Thai exporters are expected to lead the way in generating liquidity in a rice futures, many of them were not large enough to be sophisticated. Although they are considered big because of the volumes of commodity they manage, their human resources remain limited. They are not multinational grain trading companies that can have an in-house department dedicated to futures trading.

This hypothesis was contrasted by the argument that there are sophisticated actors in the rice market, including bigger exporters in Thailand and elsewhere, as well as international traders, who are in fact sophisticated. If these actors were willing to participate in futures trading and were brought within the same derivatives trading market, they could enhance the financial development of the market. Some of them may even be able to provide OTC contracts to some of the smaller player discussed previously. However, the opacity issue (discussed above) prevents many of them from getting involved. Others can also be reluctant because they know that they would, as a result) lack trading counterparts as a result. Importantly, in many countries, the number of sophisticated actors being insufficient for financial development, a regional futures market, rather than a local one, would be needed to pool together these potential participants.

Other problems discussed within the context of the developing countries hypothesis include the absence of a legal framework, lack of property rights and the various legal systems not matching the needs of western style financial trading, especially in countries that are transition economies. I argued that this is an important obstacle to OTC derivatives trading. It limits the possibility of financial development as these contracts would give less sophisticated actors an indirect access to the futures market. Only strong informal contract enforcement systems that exist in some industries (depending on the country) can compensate for the absence of formal law. However, these informal practices are not common in rice and usually exclude foreign parties that are not familiar with the local habits of the commodity industry. Nonetheless, this argument should be relativised and considered as secondary for two reasons. First, a futures contract should come before OTC trading, and futures trading are enforced through the exchange mechanisms. Although the lack of contract law could limit further expansion of the derivatives market, it is not a primary inhibitor of financial development. Secondly, it should be expected that under pressure to become more sophisticated to hedge risk, market actors could build informal enforcement mechanisms within the industry.

I have presented the four major structural factors that were observed as unfavourable for the rice market's financial development, which could be considered as impeding financial development – whether they have led to futures contract failure in the past or not. However, three sub-questions remain unanswered: how does the rice market manage its risk without derivatives? How did the compared crops developed financially? How do they compare to the rice market? Answering these questions facilitates a challenge to the hypotheses described in this section.

III) Risk management in the absence of derivatives

One of the research sub-questions is: how does the rice market currently manages its risk? That is to say, how could it be that a market doesn't develop financially if risk-averse market actors don't otherwise have the ability to sell their price risk? They should have a demand for a financial product allowing them to do so, and this demand should be matched by the offer of such a contract.

I highlighted two main ways in which some key market actors, mainly American farmers and Thai exporters, manage their risk, reducing the pressure to financially hedge. The first one is to build storage capacity, allowing market participants more flexibility in the time of selling, and as a result, allowing them to not be price takers when trading the physical commodity. This is a function of the storable nature of the crop, substituting financial hedging for physical hedging (Cordier & Gohin, 2014; Diaz-Rainey, 2017; Jégourel, 2017). Secondly, some market actors engage in diversification, whether it is in their farm activity or in the rice grade they trade, reducing their income exposure to the price variability of a single good.

Apart from these factors, which allow key market actors to manage risk differently, other factors have incentivised them to not manage risk at all. Some of these are related to factors already discussed in the conclusion. Firstly, political intervention reducing price volatility mean that the risk is afforded by public bodies instead of individual actors. The Thai rice pledging scheme illustrates the ability of the state to temporarily remove the risk for producers. Secondly, some actors prioritise their information asymmetry advantage over the ability to hedge risk. This is a matter of opportunity cost. Some Thai exporters believe that the return from opacity outweighs the risk that they cannot hedge through derivatives. Finally, if a contract does not consistently link the paper and physical market through convergence, then it does not perform its role of risk manager. Not using any risk management tools or using an ill functioning contract would make no difference except for the transaction cost of derivative trading. Therefore, in many cases it is not that there are well functioning long-term alternatives to derivative finance, but rather that derivative finance does not satisfy the need of risk management.

IV) The implications of the financial development of other commodities

The last step in determining to what extent the diagnosis of the financial underdevelopment of rice is correct implies comparing it to the environment surrounding the financial development of other commodities. Therefore, I shall answer both questions: how did other crops develop financially? How do these markets structurally differ from the rice industry?

It appears that to some extent, a failure to satisfy at least one prerequisite of financial development set out in this thesis for rice has been found in each compared crops. For instance, sugar appears as a very politicised market and this was the case for coffee and wheat in the past. When it comes to homogeneity, coffee, in particular, fails to satisfy this prerequisite. It presents a large number of grades and origins that should, in theory, complicate the establishment of a futures market. Equally, coffee, like rice, is characterised by its production in developing countries where mostly small entities with low levels of sophistication are involved in the production and trade. This is also true to some extent in sugar when it comes to sugarcane.

Despite these issues, the industries of these commodities have seen derivative contracts becoming a core component of trade. The futures markets for these crops, in New York and London, are very liquid. This proves the importance of understanding prerequisites as gradual variables. Although the sugar market is politicized, this politicization does not come in the extreme form of the rice market. In sugar, political interventions are more predictable, more manageable and unfold over the long term, where public policies tend to stabilise. Similarly, although the coffee market is not homogenous, it has been possible to create a functioning system of premium and discount, to relate different grades and origins on the futures market. In fact, all commodities are politicized to a certain degree, lack homogeneity to a certain extent, and have pockets of unintegrated markets, etc. Approaching the prerequisites as simply binary thus does not allow us to determine, in advance, whether a contract will be successful or not.

The second lesson from the failure of financially developed markets, such as the ones for soft commodities, to fulfil the theoretical prerequisites is that they are not individually *sine qua none* conditions. In many cases, the failure to tick one box can be overcome if it is the only problem. The reason why rice failed at developing financially is not because it lacks one of the prerequisites, it is rather because it fails to fulfil many of them. The sugar market may be politicized and the coffee market may lack homogeneity, but these do not accumulate multiple obstacles making the market unlikely to financially develop. Black (1985), too, had rejected the total endorsement of the prerequisites as single exclusive explanations for failure. However, instead of assuming the need for a degree of fulfilment of each prerequisite, she assumed that what mattered was the contract characteristics. In addition, the prerequisites she selected to reject the importance of the commodity characteristics, such as storability and being traded in forward markets, have since been largely discarded as conditions for the success of futures contracts.

Another take away from analysing these two crops is that geography matters when it comes to financial development. Although these agricultural goods are mainly produced in developing countries, their main destination markets are developed countries of Western Europe and North America. This has allowed futures markets to develop in the global North, within financially developed economies. These futures exchanges serve as terminal markets for other OTC markets, localised in developing countries, to emerge. Financial development in developing economies is mostly a top down effect transmitted from developed countries. In this thesis, there is no evidence that such process can happen independently within developing countries. Rice trade being characterised by unipolarisation in developing countries, unlike sugar and coffee, it had little chance of developing financially through this process. The US rice market does not compare to the Western import markets in soft commodities. There is only a share of the already small US industry that could trade derivatives, and the US paddy market is insufficiently linked to the global market in milled rice.

A key observation from the coffee, wheat and sugar markets is that history also matters. Their futures contracts have developed over long periods of time, continuously during more than a century when these commodities were already traded globally. In comparison, the rice market is very young and immature, and global trade remains marginal despite its increase. The compared crops have also experienced their share of contract failures in different countries and different contexts. The disappearance of the Tokyo Grain Exchange (TGE) coffee contract (during the merger with TOCOM) and the Singapore Exchange coffee contract show that these commodities do not always tend towards more sophistication of the market structure either. However, both coffee and wheat experienced a significant increase in financial development after the end of the cold war that put an end to much of the politicization of these crops. That suggests that structural issues surrounding a commodity can change with time. The obstacles obstructing the financial development of rice today may not still hold tomorrow.

The comparative study methodology is not perfect. It remains unclear what the modalities of the most successful commodity contract's birth were. For instance, this research was not able to determine how the issue of transparency was solved in the compared crops before the build-up of their futures contracts.

The final lesson to be learnt from the financial development of these markets is that the way a market develops financially is changing. With the rise of the Price Reporting Agencies and indices, new doors have opened for financial development. While Black Sea Wheat was a grain unlikely to develop financially two decades ago due to the low sophistication of market actors there, the emergence of the swaps model has allowed for a new form of financial development, which I argued should suit rice better. It allows for the overcoming of issues such as market homogeneity and does not, in its early phases, threaten the information asymmetry advantage of the most sophisticated actors. It also avoids the need to standardise the commodity until it is listed by an exchange and avoids any critical issue of convergence between cash and futures prices.

V) Summarising the low financial development of rice:

It is now possible to answer why financial development characterises most major agricultural markets but has remained marginal in rice. The rice market has been the birth place of derivative finance during the Meiji era in Japan, but at the time already, the market displayed signs of the issues (politicization and lack of homogeneity) that would later be deterrents to the resurgence of it financial development post WWII. Although at the time it only temporarily suppressed participation until these issues were solved, they have since grown in importance. Politicization, in particular, has become more prominent, in proportions unique to rice. This is because with the rise of voter power in countries like India and Thailand, the political salience of rice has deepened further. Government interventions in rice have, more often than not, created political uncertainty, rather than reduced price volatility. However, in both cases the politicization of rice deprives futures markets of key participants. In the first case, although commercials may still want to hedge, most speculators are unlikely to get involved and transfer the risk out of the hand of industry participants. In the second case, there is a reduced (or no) risk to trade. In addition, the growth in international trade has increased the potential for transmitting political shocks and the number of governments likely to trigger these shocks.

One issue that old Japanese futures markets never faced was the lack of potential market participants. It appeared, through this thesis, that in modern times, domestic conditions in rice producing and consuming countries made most actors in the market unlikely to participate in derivatives trading. The factors discussed through this conclusion, whether it is the opacity of the market, its size, its geography with the prominence of developing countries, created two classes of market actors that would never contribute to the initial liquidity in a rice futures contract: the unsophisticated ones and the unwilling sophisticated actors. This thesis has shown how powerful market actors have been able to prevent financial development when they perceived it as against their interests. They have done so by either refusing to participate in derivatives trading, or by pressuring governments to disrupt the functioning of commodity exchanges. In rice, the small set of actors that are sophisticated and willing to trade is spread between different domestic markets too poorly integrated to create a derivative market where they could concentrate and trade risk together.

In rice, the lack of sophistication of the market structure, due to the *ad hoc* failures of various contracts, has been harmful for the process of financial development. However, the sophistication of market actors and their willingness to trade appears even more critical in the process: while the market structure can be made partially sophisticated in the short run through the introduction of the contract, gathering enough suitable participants is a long-term problem.

Finally, one could question which out of politicization and the lack sophisticated actors willing to trade derivatives is the biggest obstacle to the financial development of the rice market. My answer is that they are equally important. Even in the absence of the other, each of these factors would heavily supress the financial development of rice.

VI) Implications for the study of the financial development of commodity markets.

To conclude the discussion of this thesis, I want to highlight its contributions to the broader study of financial development, especially in the context of developing countries.

I argued that financial development, at least for commodities, is a process that is exogenous to developing economies. The literature does not lack the argument that developing and transition economies are not conducive to the development of derivatives markets (Fernandez, 2003; Shamsher & Taufiq, 2008; Kuzman, Ercegovac, & Momčilović, 2018). While I agree with – and reinforce – this argument, I state that financial development still takes place in the domestic markets of developing countries, as has been the case in sugar and coffee. However, it does so through an expansion of the financial development of global markets, initiated in the developed West, into the domestic markets of developing countries. This expansion needs to take certain aspects into consideration, adapt with different forms of contracts (such as PTBF for coffee), and does not always manage to reach all levels of the market. That was illustrated by sugar producers in Thailand, who did not have the ability to trade risk on financial markets. In rice, the London FOX failed at expanding into Thailand despite the availability of computerised trading. This debunks the technological myth of financial development through globalisation. Fast speed cables and information technologies do not simply allow to make derivatives trading available everywhere in the world for any product. Once again, economic geography must be explored when discussing the expansion of financial development, taking into account domestic institutional cases and local socio-economic systems. I consequently argue that financial market development cannot be seen as in anyway inevitable. It is a nuanced process, heavily influenced by domestic conditions. It is not inevitable in a developed economy, even less in a developing economy. It does not quickly find its place in any economic space where the lack of active regulatory suppression allows it to. Instead, financial development needs a set of favourable conditions to slowly develop. The increase in the sophistication of market actors is a long-term process, while the sophistication of the market structure can take several attempts before being successful. Furthermore, even if financial development takes place, there is scope for the reversal of this process. Although the sophistication of market actors tends to be acquired for the long term, the sophistication of the market structure can reverse and the process of rebuilding a futures contract can be equally long. Although at the second attempt, market actors may be more capable of trading derivatives from the start, they will often feel more reluctant as a result of the first failure.

The second set of takeaways from this thesis is the importance of understanding derivatives markets as a set of derivative instruments feeding each other. Although most of my research focused on building futures contracts, I have highlighted the role of many types of OTC contracts in the process of building liquidity and making more actors able to trade risk. Futures and OTC contracts are sometimes seen as alternatives to each other (Gray, 1966; Black, 1985), while my research highlights that they ideally function in complement to each other. OTC contracts are not easy instruments to use for speculators and therefore do not allow the market to externalise the risk, taking it away from the hands of market participants. Therefore, futures exchanges serve as ideal terminal markets to OTC transactions within a commodity industry. This is even more relevant in agriculture where many small stakeholders take part in the trade and could not participate in futures trading otherwise. This is precisely what OTCs provide for futures contracts. It increases commercial liquidity by giving less sophisticated entities, who cannot afford the cost of managing margin calls or monitoring futures markets, an indirect access to futures. Usually, the OTC contracts they will enter (weather forwards, Asian options or PTBF) will be hedged by their larger counterpart on futures exchanges. Financial development becomes contingent to the existence of intermediaries that offer these OTC contracts, as Mohan (2007) had previously argued. When analysing futures market, I therefore argue that any researcher should explore the mechanism of the underlying OTC market. However, it is important to highlight that OTC markets are necessarily more difficult to document. They are not public and transparent like futures contracts are. It is less obvious who engineers and offers these contracts and tracking their participants can be challenging. There is also less consistency in their use between various actors as any OTC contract is potentially made *ad hoc*. Their mechanism can vary indefinitely and capturing the rational of their mechanisms can be a lengthy challenge for an academic researcher. This may explain why commodity OTCs are often overlooked in the existing academic literature, and why their complementarity with futures market has not been clearly articulated before.

The last legacy of this thesis regards the behaviour of individual agents in the face of financial development. Firstly, as Hardie (2012) theorised from the case of government bond markets, I often argued that being a highly sophisticated agent does not correlate with likeliness to pursue the sophistication of the market structure. I confirmed Gray (1966) and Perloff and Rausser's (1983) argument that some sophisticated actors protect their market power (obtained from their information asymmetry advantage) through their opposition to futures trading. Others simply estimate that other types of risk (such as default risk or crop risk) outweigh the benefit of hedging prices. Some may be able to physically reduce their risk without the need of financially selling it. Ultimately, this creates complex individual profiles regarding the willingness to support derivative markets. However, these profiles must be examined in detail within any study of financial development because they can determine the outcome (success or failure) of any derivative contract, beyond the exogenous observation of the market profile. The other lesson regarding agents' behaviour is that the presence of willing sophisticated actors is not sufficient to launch a futures contract. Their number is also critical. Through this research, I have encountered several cases of commercials willing to hedge through derivatives but who were simply deprived of counterparts. To make a derivatives transaction succeed, there must be two willing actors. To make a derivatives transaction fail, one is enough. Transposing that to the need of large liquidity to make a futures market function, contract managers face the particularly challenging job of convincing many to be involved or they will be disappointing the few that wished them success. Individually, sophisticated market participants have more power to impede a contract than to make it work. This is one way to cause failures in the financial development process, one of many. So many that I come to wonder if rice, and its low financial development, was really the anomaly.

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List of interviewees[140]

July 2017:

Julian Roche, *Former Product Developer at London FOX*, Western Australia

Ben Savage, *Rice Broker at Jackson Rice*, England, UK

August 2017:

John Morgan, *Vice President, Supreme Rice Mill*, Louisiana, USA

Two Anonymous interviewees, *US Rice Millers*, USA

Anonymous interviewee, *US Rice Miller*, USA

Paul "Jackie" Lower, *US Rice Farmer*, Louisiana, USA

John Owen, *US Rice Farmer*, Louisiana, USA

John Denison, *US Rice Farm Manager at Sweet Lake Land and Oil Co*, Louisiana, USA

Anonymous interviewee, *US Rice Farmer*, Louisiana, USA

Anonymous interviewee, *US Rice Broker,* Louisiana, USA

Milo Hamilton, *Former Head of Trading at Uncle Bens (Mars), President at Firstgrain,* Texas, USA.

September 2017

Scott Minton, *CME Rice Futures Broker*, Chicago, USA

Jack Scoville, *CME Commodity Futures Broker*, Chicago, USA

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[140] In this list, the location provided is the one of the interviewee at the time of the interview. I do not detail which interview were conducted face to face and which were held on the phone in order to protect the anonymity of some of my participants.

Anonymous Interviewee, *US agricultural futures markets stakeholders*, USA

Two Anonymous Interviewee, US *agricultural futures market stakeholders*, USA

Fred Seamon, *Director in Agricultural Markets at CME Group*, Chicago, USA

Anonymous Interviewee, *Wheat Market Analyst,* Illinois, USA

Anonymous Interviewee, *Commodity Markets Analyst,* Illinois, USA

Anonymous Interviewee, *US rice futures trader*, Illinois, USA

December 2017

Lamon Rutten, *CEO at Indonesia Commodity & Derivatives Exchange*, Jakarta, Indonesia

Luke D., *US Rice Farmer*, Louisiana, USA

March 2018:

Anonymous Interviewee, *Vietnamese Rice Trader*, Vietnam

Hoang Hai, *CEO and Founder luagaoviet.com, Rice Market Analyst*, Vietnam

April 2018:

Sally Trethewie, *Former Research Fellow at RSIS Centre for Non-Traditional Security (NTS) Studies (Singapore)*, Edinburgh, UK

John Lestingi, *US Rice Exporter*, USA

Anonymous Interviewee, *Coffee and Sugar Analyst*, Switzerland

Swithun Still, *Black Sea Grain Trader*, Switzerland

May 2018:

Masahiro Yamashita, *ex-General Manager at Tokyo Grain Exchange*, Tokyo, Japan

Anonymous Interviewee, *Rice and Comodities Trader*, Singapore

July 2018

Anonymous Interviewee, *Thai Rice Exporter at Tanasan,* Thailand

Anonymous Interviewee, *Thai Rice Trader and Exporter,* Thailand

Anonymous Interviewee, *Thai Rice Miller, Trader and Exporter,* Thailand

Anonymous Interviewee, *Vietnamese Rice Broker,* Mekong Delta, Vietnam

November 2018

Anonymous Interviewee, *European swaps and futures broker*, Switzerland

January 2019:

Anonymous Interviewee, *International Trader of Vietnamese Coffee*, Vietnam

Chandra Hartono Jokowdjaja, Rice Exporter at Ponglarp, Thailand

February 2019

Mr R.[141], *Vietnamese Coffee Exporter,* Vietnam

March 2019

Three Anonymous Interviewees, *Japan Rice Market Stakeholder*, Japan

April 2019

Anonymous Interviewee, *International Wheat Trader,* Singapore

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[141] A pseudonym has been used

May 2019

Anonymous Interviewee, Soft Commodities Futures Markets Stakeholder, London, UK

September 2019

Julian Price, Sugar Trade Analyst at julianprice.com, London, UK

November 2019

Arjun Verna, Former Trader of Thai Rice and Sugar, Singapore

Appendix A

THAI HOM MALI RICE STANDARD

GRADES	COMPOSITION WK	B	b	C1	RICE AND MATTER THAT MAY BE PRESENT, NOT EXCEEDING DM	Y	CH	RD	FOR	GLU	Pd	MIL	B(mm)	S(mm)
WR 100% A	60	4	-	-	-	-	3	-	-	1.5	5	EW	5.2	-
WR 100% B	60	4.5	0.5	0.1	0.25	0.2	6	-	0.2	1.5	7	EW	5.2	3.25
WR 100% C	60	5	0.5	0.1	0.25	0.2	6	-	0.2	1.5	7	EW	5.2	3.25
WR 5%	60	7	0.5	0.1	0.25	0.5	6	2.0	0.3	1.5	10	W	4.6	2.15
WR 10%	55	12	0.7	0.3	0.50	1.0	7	2.0	0.4	1.5	15	W	4.3	2.15
WR 15%	55	17	2.0	0.5	1.0	1.0	7	5.0	0.4	2.0	15	RW	4.0	1.96
CR 100% A	80	4	-	-	0.50	0.50	3	1	3	1.5	0.5	-	5.4	-
CR 100% B	80	4.5	-	-	0.75	0.75	6	1.5	5	1.5	1	-	5.4	-
CR 100% C	80	5	-	-	0.75	0.75	6	2	5	1.5	1	-	5.4	-
CR 5%	75	7	-	-	1	1	6	2	6	1.5	1	-	4.7	-
CR 10%	70	12	-	-	1	1	7	2	7	1.5	2	-	4.4	-
CR 15%	65	17	-	-	1.5	1	7	5	8	2.5	2	-	4.1	-

BROKEN RICE	OBTAINED FROM	WK	C1	WK+6.5 UP	5.0 UP	6.5 UN	5.0 UN	WK+6.0 UP	TOTAL + C1	C1	FOR
WR A1 EXTRA SUPER	100%	<15	<=1	-	>=74	-	<=10	-	GLU 1.5	0.5	0.5
WR A1 SUPER	100%, 5%, 10%	-	<=5	<=15	-	>=80	-	-	GLU 1.5	0.5	0.5

Reference : Notification of Ministry of Commerce, October 31, 2001

1) Purity of Thai Hom Mali Rice* not less than 92%.
2) Moisture content shall not exceeding 14 %.
3) General characteristic is long grain, white color and naturally low challky.
4) Free from live insects.
5) Size of kernel are as follows :
- Average length of Whole kernel without broken part shall be not less than 7.0 mm.
- The rate of avearge length against average width of the Whole kernel without broken part shall be not less than 3.2 : 1.

6) Chemical properties are as follows :
- Amylose content shall be not less than 13% and not exceeding 18% at the moisture content of 14%.
- Alkali spreading value shall be at level 6-7.

** Thai Hom Mali Rice according to this standard is from KAO DOK MALI 105 variety and RD 15 variety only.*

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BUREAU VERITAS

THAI RICE STANDARD

THAI HOM MALI RICE STANDARD

GRADES	CLASSIFICATION 1	2	3	SHT	COMPOSITION WK	B	b	C1	RICE AND MATTER THAT MAY BE PRESENT, NOT EXCEEDING DM	Y	CH	RD	FOR	GLU	Blk	Prt&PC T/T	Prt&PC Prt	Pd	MIL	B (mm)	S (mm)
WR 100% A	70	-	5	0	60	4	0	0	0	0	3	0	0	1.5	-	-	-	5	EW	5.2	-
WR 100% B	40	-		5	60	4.5	0.5	0.1	0.25	0.2	6	0	0.2	1.5	-	-	-	7	EW	5.2	3.25
WR 100% C	30	-		5	60	5	0.5	0.1	0.25	0.2	6	0	0.2	1.5	-	-	-	7	EW	5.2	3.25
WR 5%	20	-		10	60	7	0.5	0.1	0.25	0.5	6	2	0.3	1.5	-	-	-	10	W	4.6	2.15
WR 10%	10	-		15	55	12	0.7	0.3	0.50	1	7	2	0.4	1.5	-	-	-	15	W	4.3	2.15
WR 15%	5	-		30	55	17	2	0.5	1	1	7	5	0.4	2	-	-	-	15	RW	4.0	1.96
WR 25% SUPER				50	40	28	-	1	1	1	7	5	1	2	-	-	-	15	RW	3.2	-
WR 25%		>=50		50	40	28	-	2	2	1	8	7	2	2	-	-	-	20	O*	3.2	-
WR 35%				50	32	40	-	2	2	1	10	7	2	2	-	-	-	20	O*	3.2	-
WR 45%				50	28	50	-	3	2	1	10	7	2	2	-	-	-	20	O*	3.2	-
CR 100% A	70	-		5	80	4	-	-	0.50	0.50	3	1	3	1.5	-	-	-	0.5	-	5.4	-
CR 100% B	55	-		6	80	4.5	-	-	0.75	0.75	6	1.5	5	1.5	-	-	-	1	-	5.4	-
CR 100% C	40	-		7	80	5	-	-	0.75	0.75	6	2	5	1.5	-	-	-	1	-	5.4	-
CR 5%	30	-		10	75	7	-	-	1	1	6	2	6	1.5	-	-	-	1	-	4.7	-
CR 10%	20	-		15	70	12	-	-	1	1	7	2	7	1.5	-	-	-	2	-	4.4	-
CR 15%	10	-		35	65	17	-	-	1.5	1	7	5	8	2.5	-	-	-	2	-	4.1	-
PAR 100% STX	60		-	10	80	4	0.5	0.1	1	0.25	-	0.5	0.2	1.5	0.10	1.5	0.5	3	EW	5.2	3.25
PAR 100%	60		-	10	80	4	0.5	0.1	1	0.50	-	0.5	0.2	1.5	0.25	2.5	1.0	5	EW	5.2	3.25
PAR 5% STX	45		-	20	80	7	0.5	0.1	1	0.50	-	1	0.2	1.5	0.15	2.0	0.75	5	W	4.6	2.15
PAR 5%	45		-	20	80	7	0.5	0.1	1	1	-	1	0.2	1.5	0.25	3.0	1.5	10	W	4.6	2.15
PAR 10% STX	30		-	20	75	12	0.7	0.3	1.5	0.75	-	2	0.4	1.5	0.20	2.5	1.0	5	W	4.3	2.15
PAR 10%	30		-	20	75	12	0.7	0.3	1.5	1.50	-	2	0.4	1.5	0.25	3.5	2.0	10	W	4.3	2.15
PAR 15%	25		-	30	70	18	1	1	1.5	2	-	5	0.7	2.5	0.50	4.0	2.5	10	RW	4.0	1.96
PAR 25%	20		-	30	60	28	-	2	1.5	3	-	7	1	2.5	0.75	4.5	3.0	10	OR	3.2	-
															WR						
GLU 10%		-			55	12	0.7	0.3	0.5	1.5	-	2	0.5	-	15	-	-	10	W	4.2	2.1
GLU 25%					40	28	-	2	2	4	-	6	3	-	15	-	-	20	OR	3.2	-

BROKEN RICE	OBTAINED FROM	WK	C1	WK+6.5 UP	WK+6.0 UP	5.0 UP	6.5 UN	6.0 UN	5.0 UN	TOTAL + C1	C1	FOR
WR A1 EXTRA SUPER	100%	<15	<=1	-	-	>=74		-	<=10	GLU 1.5	0.5	0.5
WR A1 SUPER	100%, 5%, 10%	-	<=5	<=15	-	-	>=80	-	-	GLU 1.5	0.5	0.5
WR A1 SPECIAL	15%, 25% SUPER	-	<=6	<=15	-	-	>=79	-	-	GLU 2.5	0.5	1.0
GLU A1	10%, 25%	-	<=5	<=15	-	-	>=80	-	-	WR 15	5	0.5
PAR A1	VARIOUS GRADES	-	<=6	-	<=10	-	-	>=84	-	-	-	1.0

Definitions

1 = Long Grain Class 1. Length exceeding 7.0 mm.
2 = Long Grain Class 2. Length exceeding 6.6 - 7.0 mm.
3 = Long Grain Class 3. Length exceeding 6.2 - 6.6 mm.
SHT = Short Grain , Length not exceeding 6.2 mm.
WR = White Rice — *CR* = Cargo Rice
PAR = Parboiled Rice — *GLU* = White Glutinous Rice
WK = Whole Kernels — *B* = Broken & Small Broken C1
b = Broken not reaching the min. specification & not pass sieve no.7
C1 = Small Broken C1 — *DM* = Damaged Kernels
Y = Yellow Kernels — *CH* = Chalky Kernels
RD = Red and/or Undermilled Kernels
FOR = Foreign matter,Undeveloped,Immature and Other Seeds
Blk = Black Kernels — *Prt* = Partly Black Kernels
PC = Peck Kernels — *T/T* = Total
Pd = Paddy (Grain per 1 Kg. or %)
MIL = Milling Degree — *STX* = Sortexed
EW = Extra Well Milled
W = Well Milled
RW = Reasonably Well Milled
OR = Ordinarily Milled
*O** = Ordinarily Milled, not better than Reasonably Well Milled
B (mm) = Size of Broken max.
S(mm) = Size of Broken min.
WK+6.5 UP/WK+6.0 UP = Whole Kernels and Brokens having the length as from 6.5 / 6.0 parts onward ; combined
6.5 UN/6.0 UN/5.0 UN = Brokens having the length not reaching 6.5/ 6.0/ 5.0 parts and not passing through sieve no.7
5.0 UP = Brokens having the length as from 5 parts onwards

*** The moisture content of rice of all types and all grades is specified not exceeding 14 %*

***Reference : Notification of Ministry of Commerce, Thai Rice Standard , 1997*

Appendix B

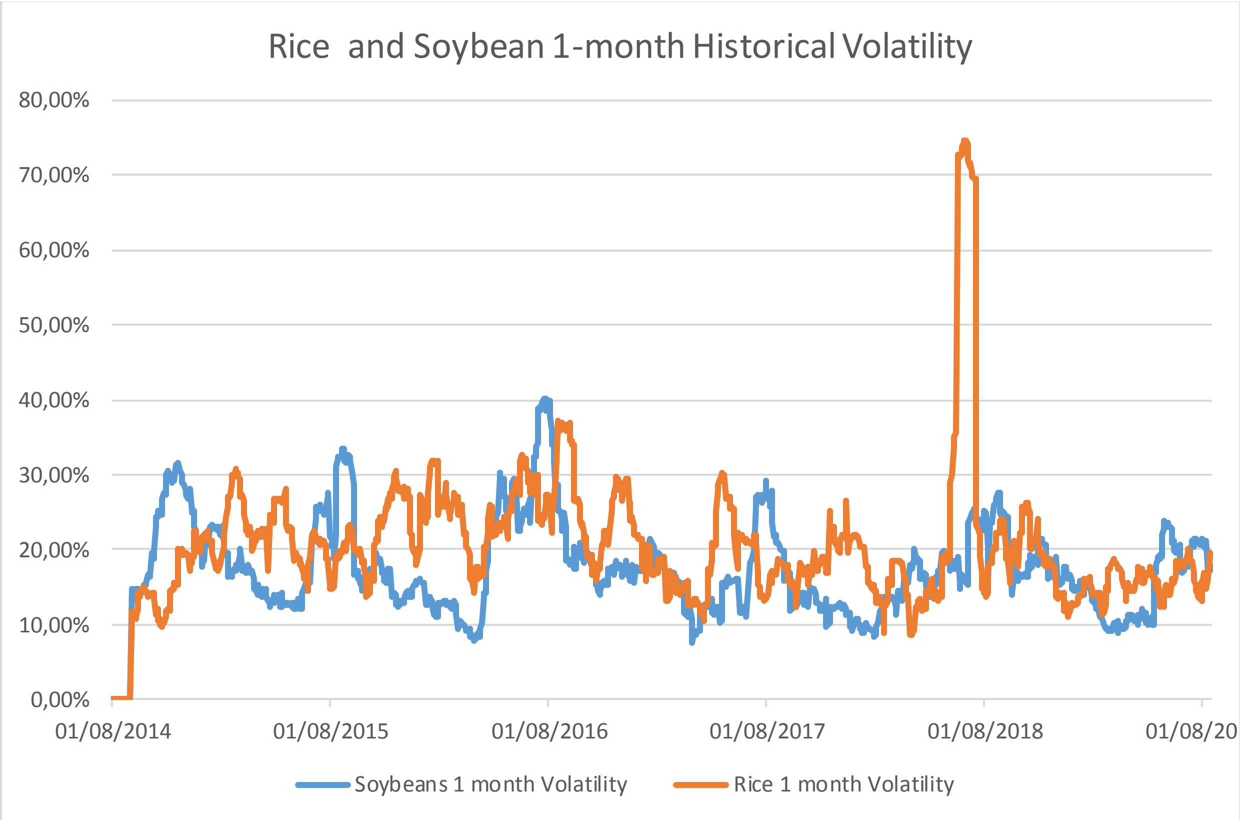
Common futures contract specifications.

Grade and Quality	This specifies the standards of the commodity that should be in the delivery. Varieties and qualities can vary significantly within a commodity market (involving differences in prices), and stakeholders taking delivery should know what they will receive.
Contract Unit (contract size)	This is the quantity of the commodity represented by the contract. If delivery takes place, the quantity of commodity delivered will be matching the contract size.
Price Quotation	The price quotation indicates the currency the contract is denominated in, and for what volume is the price quoted. This volume can be different from the contract volume. For instance, the CME rough rice contract is for 2000 hundredweights, but the price quotation is in cents per hundredweight.
Minimum Price Variation	Also called tick size, it represents the minimum the minimum price difference at which market participants can trade the contract, and the unit at which the price of a contract can move. . It is usually denominated both in the price per unit of commodity and the price for the entire contract.
Trading Hours	These are the hours during which trading takes place. They are important because, for a contract with a global ambition, trading hours are often extended to attract liquidity from other areas in the world.
Settlement Method	The settlement method specifies if the commodity is deliverable or not. If it is not, contract users will use cash settlement. (see section below)
Listed Contracts	This is the list of existing delivery months. A futures contract reaches expiration (involving settlement and delivery) multiple times a year, in different months. Market participants can trade any delivery months but will tend to focus on the months where they will find liquidity (see below).
Position Limits	Market participants individually face position limits determined by the exchange, which represent the number of contracts owned by a trader at one point in time that may not be exceeded. There is usually a different position limit in the spot month (the nearby contract once it enters its delivery period) and in all other months.
Price Limit	The price limit is the level that the price of a contract is allowed to rise or fall to before trade is suspended until the next day. The price limit is determined from the previous day closing price. For instance, if the price

	limit for rough rice on the CME is $0.90 and the previous day closing price was $12.30, the trade would be suspended if the price rose to $13.20 or fell to $11.40.
Delivery Points	Certain contracts specify exchange designated warehouses suitable for the delivery of the commodity. Sometimes the delivery point is not a warehouse but a port, for instance. Some contracts specify Freight on Board instead, meaning that the commodity is delivered once it is loaded in a vessel at a specified location.

By the author

Appendix C



Volatility of the CME Soybean and Rice continuous contracts.

Calculated by the author.

Data source: Quandl

Appendix D

Government Interventions in the Rice Futures Exchanges

Date	Orders and Amendments
May, 1890	Rice futures exchanges accept imported rice as an alternative to listed domestic rice.
November, 1890	The amendment of May 1890 is abolished.
January, 1898	The amendment of May 1890 is revived.
October, 1898	The amendment of January 1898 is abolished.
June, 1912	Rice futures exchanges accept imported rice from Taiwan and Korea as an alternative to listed domestic rice.
October, 1912	The amendment of June 1912 is abolished.
March, 1913	The exchanges accept imported rice from Taiwan and Korea as an alternative to listed domestic rice on a steady basis.
August, 1914	Rice from Taiwan is undeliverable.
April, 1918	Low-quality domestic rice is deliverable and the exchanges accept a change to the standard rice from medium quality to low quality.
February, 1919	Rice from overseas is deliverable.
November, 1919	Lowest quality domestic rice is deliverable and the exchanges accept a change to standard rice from low quality to lowest quality.
December, 1919	Rice from overseas (excluding Korea) is undeliverable.
October, 1920	The exchanges accept a change to standard rice from lowest quality to medium quality.
December, 1920	Lowest and low-quality domestic rice is undeliverable.
November, 1921	Low-quality domestic rice is deliverable.

Sources:
(1) Bank of Japan (1957), "1899 Statistical Yearbook of Bank of Japan," in Nihon Kinyuushi Shiryo Meiji-Taisho Hen Dai 19 Kan [Materials on Japanese Financial History in the Meiji-Taisho Period Vol.19], Printing Bureau of Ministry of Finance, Tokyo, Japan.
(2) Ministry of Finance, Financial Bureau (1919), "History of Rice Price Adjustment in the Meiji-Period," Tokyo, Japan.

Table from Ito, Maeda & Noda, (2017)

Appendix E

Vietnamese coffee contracts specifications:

Specifications	2011, BCEC	2015, BCCE
Quality	Robusta Grade R2B (Moisture: 12.5% ; Foreign matter: 1% ; Blacks and Brokens: 5%; Screen 13: > 90%) Robusta grades R1A, R1B, R1C et R2A are delivered at contract price plus premium.	Processed and unprocessed Robusta coffee, to be Standardized to Robusta coffee Grade 2 (Moisture: 15% ; Foreign matter: 1% ; Blacks and Brokens: 5%; Screen 13: > 90%; Screen 12: > 98%)
Trading time	2pm – 5pm, Monday to Friday	From 08:00am Monday to 12:00pm Saturday
Place of Transaction	Center BCEC – 153 Nguyen Chi Thanh – BuonMaThuot - Daklak	BCCE - 161 Nguyen Chi Thanh – BuonMaThuot - Daklak
Unit of Currency	VND/kg	VND/ton; USD/ton
Tick Size	10 VND/kg (20 000 VND/lot)	100,000 VND/ton, 1USD/ton
Contract Size	2 tons	10 tons
Delivery Months	6 consecutive delivery months	January, March, May, July, September, November
Stop Loss/Gain	+/- 4% of the previous day settlement price.	- 5% of the previous day settlement price.
Minimum Margin	15%	10%
Margin Call	N/A	7%
Delivery Point	Warehouse system of BCEC	Warehouse system of BCCE

Source: (Nguyen, 2015; BCCE, 2015)

CONTRACT VRC/VLRC - Robusta	
Contract Unit	1,000 kg/lot (VRC); 10,000 kg/lot (VLCR)
Quality Norms	- Sample weight: 300 g - Blacks and Brokens: < 3% - Foreign matters: < 0,5% - Moisture: < 12,5% - Screen 14: > 90% - Screen 12: > 96%
Delivery Months	January, March, May, July, September, November
Currency	VND
Tick mark	10VND/kg
Unit of delivery	N x 20 tons
Trading hours	3pm – 11pm
Position Limits	For individuals: <= 5.000 lot of net buy or net sell

	For companies: <= 20.000 lot of net buy or net sell VNX can change the position limits according to the real demand
Delivery place	VNX warehouses

CONTRACT VIAC/VKC - Arabica	
Contract Unit	1.000 kg/lot (VIAC)/ 37,5000 pounds/lot (VKC)
Quality Norms	- Sample weight: 300 g - Between 9 and 23 full imperfections - Screen 15: > 50% - Screen below 14: < 5% - Moisture: 9% - 13%
Delivery Months	March, May, July, September, December
Currency	VND
Tick Mark	10VND/kg
Delivery Unit	N x 20 tonnes
Trading Hours	2:30pm – 1:00 am
Position Limit	For individuals: <= 5.000 lot of net buy or net sell For companies: <= 20.000 lot of net buy or net sell VNX can change the position limits according to the real demand
Delivery Location	VNX Warehouses

Source: (Nguyen, 2015)